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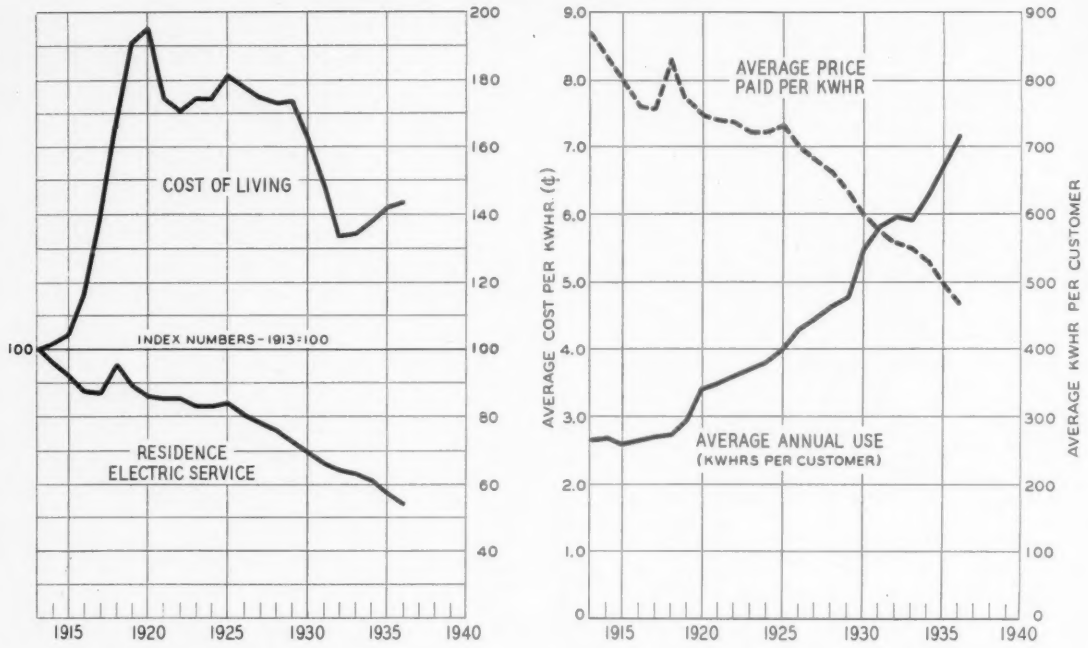
EDISON ELECTRIC INSTITUTE

RESIDENTIAL ELECTRIC SERVICE



RESIDENTIAL ELECTRIC SERVICE AND COST OF LIVING

Index Numbers—1913 = 100

Year	Average Annual Use Kwhr	Average Annual Bill	Average Revenue per Kwhr	Cost of Living[a]	Residential Electric Service
Dec., 1913	264	$22.97	8.70¢	100.0	100.0
" 1914	268	22.25	8.30	102.7	95.4
" 1915	260	20.80	8.00	104.7	92.0
" 1916	265	20.15	7.60	116.6	87.4
" 1917	268	20.15	7.52	138.3	86.4
" 1918	272	22.50	8.27	166.9	95.1
" 1919	293	22.55	7.70	191.4	88.5
" 1920	339	25.25	7.45	195.6	85.6
" 1921	347	25.65	7.39	174.9	84.9
" 1922	359	26.50	7.38	170.3	84.8
" 1923	368	26.50	7.20	174.7	82.8
" 1924	378	27.25	7.20	174.3	82.8
" 1925	398	28.90	7.30	181.3	83.9
" 1926	428	29.87	6.98	178.3	80.2
" 1927	444	30.19	6.80	175.0	78.2
" 1928	463	30.76	6.60	173.2	75.9
" 1929	477	30.05	6.30	173.7	72.4
" 1930	548	32.88	6.00	163.6	69.0
" 1931	580	33.29	5.74	148.3	66.0
" 1932	597	33.25	5.57	133.5	64.0
" 1933	593	32.56	5.49	134.6	63.1
" 1934	624	33.07	5.30	137.8[b]	60.9
" 1935	669	33.38	4.99	141.7[c]	57.4
" 1936	719	33.72	4.69	143.6[d]	53.9

[a] *U. S. Bureau of Labor Statistics (Revised Series—September, 1935).*
[b] *November 15, 1934.*
[c] *January 15, 1936.*
[d] *Sept. 15, 1936.*

These Charts and Table are from Statistical Bulletin No. 4, discussed in article on opposite page.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume V FEBRUARY, 1937 No. 2

Latest Annual Statistical Bulletin Is the Most Comprehensive Yet Published

THE great extension of the use of electricity in the United States during the past ten years is presented in detail in EEI Statistical Bulletin Number 4, which was published early this month.

The Bulletin, the most comprehensive yet published, contains the records of the principal operations of the electric light and power companies, together with those of the municipal plants and covers the period since 1926, when the collection of national data was begun. In addition to showing the historical summary for the period 1926 to 1936 for the source and disposal of energy, the relation of generation and generating facilities and interconnection facilities, the report contains a complete analysis of each of the several major classes of service rendered. Financial statistics of the industry appear in the Bulletin for the first time, including an income statement for the years 1932-1935. The Bulletin contains a total of 47 tables and 11 charts, in addition to the text.

The Bulletin shows that all classes of the industry's customers purchased 15.3 per cent more electricity in 1936 than in 1935 but paid only 7.7 per cent more for their service last year than in the preceding twelve months.

During the year 1936, power output exceeded the 100 billion mark for the first time in history. Production by water power was 37 billion kilowatt-hours, by fuels was 69 billions and power imported and purchased from other sources, 3 billions; making a total output for the industry of 109 billion kilowatt-hours. This constitutes an increase of 14½ per cent over the figures for the previous year and of 56 per cent over 1926, when the statistical service was begun.

Generating capacity at the close of 1936 was estimated at 34,076,000 kw of which 9,410,000 kw, or 28 per cent, was in water power stations, 24,026,000 kw in steam stations and 640,000 kw in internal combustion engine plants.

Considerations that have favorably affected the annual production per kilowatt of generating capacity during the past several years are: sales promotion programs and encouragement of "off-peak" sales to bring about an improvement in the daily load curve, and advances in effective interconnection to reduce the requirement for reserve capacity and to permit longer hours of use of generators.

Total construction expenditures for 1936 were estimated at $275,000,000, less than one-third of the peak 1930 figure but a gain of 43 per cent over 1935.

Plans now under way provide for the adding of considerable generating capacity in 1937 and 1938. Except for possible rising prices, the expenditures will, however, be less than that normally required for new construction in that much of the new capacity will be installed as additional units in existing stations or as high pressure units superimposed on existing medium pressure units.

The industry has been conducting such national promotional programs as the "Better Light-Better Sight" cooperative sales program, the "Electrical Housewares" and the rural "Running Water" campaigns. Another forward-looking activity, the "Kitchen Modernizing" program to popularize the all-electric kitchen and to promote kitchen planning is under way. These campaigns are supported by all branches of the electrical industry and other interested agencies. They stimulate and pioneer merchandise sales of electrical equipment by all retail outlets. As a result of this policy dealers other than the utilities in 1935 sold over $452,000,000 worth of merchandise, which was 85 per cent of the total of such sales.

Refrigerator sales show clearly how national promotional efforts have brought that appliance through the pioneering stage to its present acceptance. In 1936, for instance, of 1,956,327 refrigerators sold in the first eleven months, it is estimated the non-utility outlets sold practically 90 per cent.

More than 26,100,000 customers are now receiving electric service, the Bulletin points out. This represents an increase of nearly 800,000 customers during the year and a gain of 6,000,000 during the past ten years. Of the customers newly connected during 1936, about 96,000 were farms.

It is estimated that 915,000 farms were supplied with electricity at the end of 1936, or about 14 per cent of all farms having occupied dwellings and 21 per cent of all farms which had dwellings valued at more than $500.

Although production exceeded the 100 billion mark, the total sales of power to all ultimate consumers for 1936 amounted to 89,500,000,000 kilowatt-hours compared with 77,596,025,000 kilowatt-hours sold in 1935, an increase of 11,903,975,000 kilowatt-hours. Total revenue from these sales aggregated $2,058,300,000 compared with $1,911,988,900 for 1935, an increase of $146,311,100.

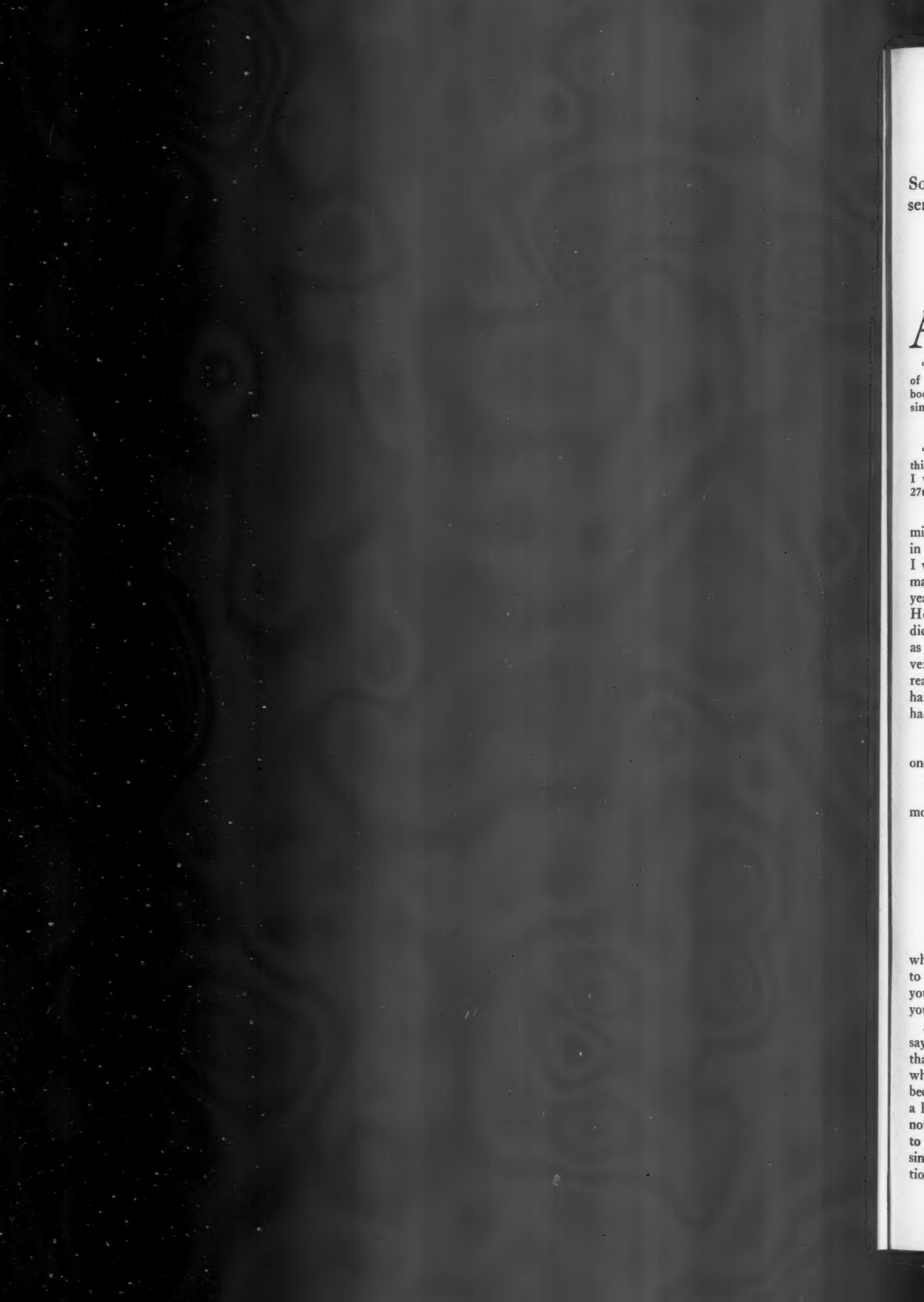
Revenue per kilowatt-hour for all classes of service in 1936 was 2.30c compared with 2.46c in 1935, a decrease of 6.5 per cent, the figures revealed.

Of the total sales of electricity, large industrial and commercial users took 48,378,000,000 or some 54 per cent. These customers used 18½ per cent more electricity than they did the pre-

(*Continued on page* 42)

Michigan Avenue, Chicago

The Fifth Annual Convention of the
EDISON ELECTRIC INSTITUTE
Will Be Held at the Palmer House, Chicago
June 1-4, 1937



Alex Dow

Some observations on the occasion of the presentation of the Edison Medal for 1936 to Mr. Dow. Presented at the Midwinter Convention of the American Institute of Electrical Engineers, Jan. 27, 1937.

By Louis H. Egan
President, Union Electric Light & Power Co.

A MONTH or so ago a telegram came to my desk one afternoon, reading something like this:

"The Institute is about to hang some kind of a medal on me. They would like somebody to be present and tell something of my sins. Would you mind undertaking it?"

My answer was:

"I have been talking about you for almost thirty-five years, and God being good to me, I will be delighted to continue that on the 27th of January."

And it is almost thirty-five years my mind goes back to a very modest office in Sault Ste. Marie, Michigan, where I was introduced by a mutual friend. A man sat there at a roll-top desk. The years have dealt rather kindly with him. He doesn't look much different than he did then. Perhaps he doesn't move quite as fast, and that is no wonder. He moved very fast in those days. I think that one reason why his head then had no more hair than it has now is that the brains had taken their place.

He said, "You want a job?"

I said, "I hope I do. I'd like to have one."

"How much have you been getting?"

"Sixty-two dollars and a half a month."

"How old are you?"

"I am twenty-three."

"Technical training?"

"Yes."

"You married?"

"No."

I was guiltless in those days.

"It's a good thing not to be married when you are a young man. I may want to send you all kinds of places, and when you have a wife trailing along behind you, it complicates the situation."

And so it began. As Mr. Kipling says, "That's the way it began, my dears; that's the way it began." And after a while we moved down to Detroit and I became the proud possessor of a job on a line gang, not one of the sky climbers, not that good, but a great delight came to me then, and I have enjoyed it ever since; and I have enjoyed the recollection of it.

MR. DOW

Mr. Dow was beyond belief in his method of treatment and in the rare privilege that came to be mine of being welcomed into their home, and there I came to understand one of the reasons for his success, and she is here tonight, and I would indeed be derelict if I didn't mention and give full credit to the very delightful and lovely hospitality that she offered to me at that time—Mrs. Dow.

When you are making slings to send up crossarms and when you are sending up solder pots on cold days, nobody has to call you twice for breakfast. I remember at the Dow's household that this lovely type of informality existed, and you had a feeling that that was the type of home of which America should be proud, which perhaps is a large factor in the making of America as we know it today; and there one of the things that came to me was an invitation to Sunday morning breakfast. I was young and my appetite was good, and Mr. Dow often tells the story that on one morning after I had consumed an unbelievable amount of pancakes, the creation of which had been directed by the lady from Baltimore, there being one left, I put it on the gramaphone to see if it wouldn't play "Maryland, My Maryland."

I am not going to undertake to tell you here tonight very much, if anything, about the big boilers, or about the unusual transmission system, and the substations, and the stores department, and how we handled the meters, and all the rest of this, our public relations, and so forth. You will hear those from others, possibly, and if you don't, you can find them out very readily. They have been published many times.

* * * * *

. . . For over forty years he has been the guiding factor and the principal factor in the creation of his company. It is recognized both in the United States and abroad as a model example of its kind.

One of the big difficulties in my appearance here tonight is to undertake in the limited time that is available, and, very properly so perhaps—a contact of almost thirty-five years—how do you concentrate thirty-five years into less than that many minutes?

I can't begin to tell you of the things that sweep through my mind as I stand here thinking about what Mr. Dow is and what he has done. Would you like to know something of the geological history of the Grand Canyon of the Colorado? Would you like to know something of the influence of music on the French Revolution? Would you like to know the history of the War of 1812? Then I take it that doesn't sound many responsive chords among you—where it occurred, when it occurred, why it occurred, the principal battles, the principal generals, the terms of the treaty of Paris?

Did you ever know anybody who read the Encyclopaedia Britannica for interest and general information, from beginning to end? When I first knew him, he had gotten down to "K."

Would you like to know somebody who thought of most of the things that come to your minds about the light and power industry today, thought of them twenty-five years ago, and forgot them? If you think that you are about to de-

velop something new in this industry, I warn you, because I have made the mistake, you had better go back and dig up the proceedings of the National Electric Light Association, and the Association of Edison Illuminating Companies, and there you will find them expounded almost a quarter of a century ago by Mr. Dow. It doesn't make any difference whether it deals with customer relations, whether it deals with street lighting, whether it deals with the contacts of municipalities, or government control; it is all there. I have looked them up and read them.

What a great treat it must be to all these thousands and thousands of young men and women, just as it was to me, to come in contact with a mind of that kind in this business! I can't begin to tell you the thankfulness that is in my heart tonight for the things that he did to me, sound, true, sane, stable principles that he has followed and preached since he started.

You talk about there being no romance in business! Only careless, foolish people say that. A young boy in Scotland—nobody to help him—an orphan in his early years, people to assist; he starts out by just sheer industry, perseverance, the will to make good, he comes to this country, takes half a dozen simple jobs of one kind or another, all the time storing up in this retentive memory of his the things that are going to be to his advantage in the future.

Finally he lands in Detroit to put in a municipal street lighting system, and, after he did it, the local company said: There is the type man we want.

He has been there forty-one years doing that job. Why, it is an inspiration beyond belief! It is the kind of thing that is the United States of America at its best. What he has done for people all over this country will never be known.

A telegram comes to my office:

"A man I used to know is in trouble. His wife has no money. Would you honor my check for sixty dollars if it arrives tomorrow, and send it out to her today?"

Another one:

"A friend of mine in Detroit is being swindled by a man in your town. Would you mind looking it up and telling me if it isn't so? Want to stop it."

And only last summer I ran across a pitiful case, far away from here, a man on whom evil days had come, a former member of this Institute, and when I told Mr. Dow about him, he said, "We shall have to do something for him."

And so it goes. His breast is shining with unseen medals for the goodness that he has done. I could continue this eulogy for a long, long time. It has been said and said well, perhaps those who don't think well imagine it becomes trite, that a big enterprise is a shadow of a man, but it is true; it never was more fully exemplified than it was in this case.

But the sun is setting, and the shadow becomes long. It isn't a dark shadow. It is a shadow that shines with a roseate light, a white shadow, if you will, the kind of shadow that will last forever in the district where it has first fallen, and that is what his shadow will be on his chosen state and his chosen city.

A few years ago, on the occasion of introducing Mr. Dow to an audience, I said, and I will repeat it at this time, that under no conditions will I ever present him to an audience or to any person —I just lend him to you for a little while.

• • Briefs • •

1936 Taxes May Exceed 20% of National Income

Taxes—Federal, state and local, paid by the American people in 1936 now seem likely to take more than 20 per cent of the entire national income last year. . . . The contribution of 20 per cent compares with 27.4 per cent paid in 1934 in France and with 24.4 per cent in the United Kingdom and 22.7 per cent in Germany in 1935. (*Wall Street Journal,* Jan. 7, 1937.)

Gasoline Taxes in 1936 Exceeded the Entire Bill for Domestic Electric Service

According to preliminary estimates issued by the American Petroleum Industries Committee, State sales taxes on gasoline are estimated at $685,000,000 in 1936. The Federal tax on gasoline is estimated at $190,000,000 making a total to consumers of $875,000,000. On the other hand, the total bill for domestic electric service during 1936 is estimated at $730,000,000.

Cheap Power in Ontario Depends on Immunity from Taxation—Attorney General Roebuck

"Hydro last year paid taxes on its land assessment, and full taxation on its Hydro shops, according to law. We paid to municipalities in taxation the gross sum of $232,085, and we paid to the Provincial and Dominion governments for water rights the sum of $722,842, a gross figure of $954,927. Hydro is prepared to continue these payments, but not to subject its entire plant to municipal assessment. Were this brought about *Hydro taxation would amount to something in the order of $12,000,000 per year* (about 15½ per cent of gross revenues, as compared with the U. S. average of 14 per cent—Ed.) *and cheap power in the Province of Ontario would be a thing of the past.* . . . If the power and light users of the Province are to be levied upon to fill the insatiable maw of municipal expenditures, *cheap power for lighting homes and streets and business places, and for turning the wheels of industry is gone forever,* and Toronto's commercial advantage is sacrificed for the benefits of the well-oiled spending machines of our municipal governments." (Extract from speech by Arthur Roebuck, Attorney General, Province of Ontario, Toronto, October 7, 1936, as reported in Toronto papers.)

Decrease in Auto Prices Pays Electric Bill for a Year

"At current prices, automobile buyers will save $632,000,000 compared with 1928. This amount of money would pay the nation's tax bill for two weeks, the nation's food bill for an entire month and the electric light and power bill of the nation's domestic customers for a whole year. (*Juniata Sentinel & Republican,* Mifflintown, Pa., Dec. 23, 1936.)

Federal Power Policy at the Crossroads

By Raymond Moley
Editor, Today

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EVERY man, woman and child living in this country and every person born here during the next 50 years will have a personal stake in the outcome of a controversy which is now reaching a head in Washington. True, the immediate question at issue, the relationship between the public and private interest in the Tennessee Valley region, hardly seems cosmic. But the settlement that is made at this time will shape our long-time destinies in no small degree. That is why *all* circumstances which underlie Federal water-power development ought to be clearly understood by all the parties to this controversy.

The fundamental purpose of the Federal government's power policy is perfectly simple: it is to provide cheap power for the people. Who produces electric power, who transmits it, and who distributes it—these are relatively minor questions.

Most reasonable people do not quarrel with the regulation of rates by state governments or with the attempts of the government, both Federal and state, to keep a watchful eye on the financial affairs of private utility companies.

But the Federal government is not content with these methods alone. And so it has supplemented the purely negative and legal aspects of regulation with the construction of great power plants. It has spent money on these vast projects (and here we are considering their power aspects only) for three reasons:

1. To provide a "yardstick"—which means that the government builds plants in order to "measure" the actual cost of electric power and, by comparison, the fairness of private electric rates.

2. To get prices down by actively competing against private companies.

3. To hold over private companies the threat of government ownership on a wide scale, thus forcing private companies to serve the public with greater efficiency. At this point the "yardstick" becomes a "birch rod."

The wisdom of the government in pursuing these methods need not detain us here. The arguments for and against such a policy are endless, but, at this time, we are confronted by a *fait accompli*. Congress and the President have already decided on their course. And that would seem to end the discussion and to point to the gradual extension of "yardstick" and "birch-rod" projects throughout the country, unless—and this is a big "unless"—Congress and the President have left out of their calculations an essential factor.

That factor is the relative unimportance of water power as a future source of cheap electrical energy.

All of us who are not engineers have been taught to believe that water power is the cheapest, most efficient and most permanent source of electric power. Are we right, or have we put our faith in a delusion?

A water-power project is, of course, spectacular; often it is beautifully spectacular. Water power also seems to be the free gift of God to man. And yet these things alone do not account for the hold that water power has come to have on the imagination of the country. Its popularity is, in fact, incomprehensible except in the light of the history of the past 45 years.

For 20 years, between 1892 and 1912, water power was, on the average, cheaper than steam power. It took eight pounds of coal to generate a kilowatt-hour of electricity in 1892.

Between 1912 and 1920 several factors combined to reverse the positions of water power and steam power with respect to cost.

First, engineers steadily increased the efficiency of fuel as a source of power until, by 1920, it took only three pounds of coal to generate a kilowatt-hour of electricity.

Second, the Federal and state governments became alarmed by what they believed to be the imminent exhaustion of coal- and oilfields and imposed on the private development of water-power conditions and regulations so stringent in respect to the right of recapture by the public and in other respects, that the risk to capital investment increased the cost of water-power development by private enterprise.

Third, private corporations had skimmed the cream by 1920, or thereabouts. They had snapped up and developed most of the choice water-power sites. By and large, the sites undeveloped were far from markets, involved investment out of proportion to any near-term earnings, or, as in the case of the Tennessee Valley, were both so big and so complicated by questions of navigation and conservation as to be practicable only for the sovereign power.

For these reasons, by 1920, the building of private water-power projects on any extensive scale was greatly restricted.

Finally, the government entered the field and began to construct a number of water-power projects of its own. This step was prompted partly by a desire to conserve our future power supplies and partly by a belief, sedulously cultivated by exponents of government ownership, that no nation-wide system of public-service enterprise which the government itself did not create and control, ought to exist. It was precipitated, too, by the cry that if the government did not "subdue" giant power, the people would ultimately be the helpless victims of the power "trust." From that point on, the choice of water-power projects as the means of chastening and combating the "trust" became inevitable, for insuperable constitutional difficulties lay in the way of government power production by any other means.

The Federal government has the right to build dams for navigation and flood control and hence, as an incident to these rights, to sell surplus electric power generated at the dams. It does not have the right to produce electricity for public consumption by any means other than water power.

But there were still other factors which lent allure to the hydroelectric field as far as the Federal government was concerned. The chief element of cost in the production of water power is the cost of the returns to capital. Cheap capital was more available to the govern-

ment than it could possibly be to private enterprise and adequate returns to capital were not always insisted upon by the government.

These were the long-range factors which impelled the Federal government to construct water-power projects. These were factors, too, which affected the relative cost of water power and steam power.

The ability of the Federal government to provide cheaper capital than that which was available to private enterprise made government water power cheaper than private steam power during the 1920's and early 1930's. It made government water power appear to be the answer to the national dream of cheap and abundant electricity. And, had science and invention gone to sleep during those years, government water power might still seem to be the answer to that dream today.

But science and invention were not asleep. By 1922, it took only 2.5 pounds of coal to produce a kilowatt-hour of electricity; by 1927, only 1.84 pounds of coal to produce a kilowatt-hour of electricity; by 1932, only 1.50 pounds; by 1934, only 1.45 pounds.

Or, stated another way, by 1934 engineers were able to assert that on the average water power could no longer compete with steam-generated power if all the costs of production were included in the cost of water power.

Lest there be any misunderstanding at this point with regard to my purpose in discussing this subject, I think it is well for me to say that I am not here concerned with the details of the acrimonious argument now raging between the private utilities and the TVA over the allocation of costs in the TVA's accounting, over the TVA's charges for depreciation and the like. I am concerned solely with the broad question of whether the government has not placed undue emphasis upon the development of water power throughout the country and whether it may not make a tragic error if, bewitched by an *ignis fatuus,* it provokes a destructive war with private utilities.

Why is it that, by 1934, private enterprise generally ceased to look upon water power in this country as the solution of the problem of cheap and abundant power, and regarded it as a minor and diminishing item in its calculations?

It is because of the steadily increasing efficiency of steam-generated power and the limit, long ago reached, in the efficiency of water power. Engineers know that the generation of water power has already become 95 per cent efficient—in other words, that it has reached a maximum possible efficiency. Steam production, on the other hand, despite the astonishing progress that has been made in its development since 1892, is still approximately only 25 per cent efficient. Science and invention still have ahead the possibility of new developments capable of making enormous increases in the efficiency of power generated by fuel.

Meanwhile, research has succeeded in laying a specter that has haunted us all for decades. The exhaustion of early coal- and oilfields in Pennsylvania led us to believe that the only source of power on which we could really depend in the future was water power. The Science Advisory Board's reports on the extent of our country's vast reserves of coal have exploded this delusion. At the recent World Power Conference in Washington it was shown that our present supply of all kinds of coal, allowing for the growth of consumption, will not be exhausted for 4,000 years. Allowing for the exhaustion of our oil and gas and the shifting of the burden now resting upon them to coal, we must reduce the estimate of the life of our coal supply. But even then, we find that our coal beds will continue to meet our needs for 2,000 years. As far as private enterprise is concerned, that fact, plus the reduced and constantly reducing cost of steam production, puts off the possible need of developing water power to a time wholly beyond our present concerns.

But there are still other factors which have led private enterprise to believe that the power future of the country does not lie in water power, even if the government still adheres to that view.

Private enterprise has found that in many parts of the country the life of hydroelectric projects is seriously limited by the depositing of silt in the lakes created by dams. The lakes above the dams lose depth, with the passing of time, until the power available is only that of the run of the stream. Since the run of a stream often varies 100-to-1 or more, the stream cannot be effectively used for power purposes. The power it produces becomes unsalable because it is not steady, or what engineers call "firm."

Private enterprise, unlike the government, does not have limitless amounts of money at its disposal for the salvaging of initially uneconomic investments. Private enterprise cannot afford to indulge in such activities as were outlined for the government by Morris L. Cooke, in the *New Republic* recently, when he spoke of the need for "an intensive program of protection of watersheds by vegetation and otherwise to prevent silting up of the new reservoirs." Private enterprise cannot undertake to construct further water-power projects in regions where it will be necessary, in order to preserve the original investment, to undertake vast secondary investments whose size simply cannot be estimated in advance.

Private enterprise believes that the government, in fostering big installations and long-distance transmission, is ten years behind the times. Private enterprise believes that its future lies in moderate-sized generating plants and shorter transmission lines. It has learned by experience that the most economical range of transmission is 30 to 40 miles and that moderate-sized steam plants have become practically as cheap producers as big ones. It finds that the wheel has made the complete cycle; that once more one of the cheapest ways to transmit power is to haul it by rail in a coal car.

Private enterprise has also found that steam plants can be built much more quickly than water-power projects. They can be built at approximately one-third the cost. For these reasons the cost of capital looms large in any fair reckoning of the cost of a kilowatt-hour of water-generated electricity. The cost of capital is a much less important factor in the cost of a kilowatt-hour of steam-generated electricity. On the other hand, fuel costs are a non-existent item in water power and labor costs are only a fraction as great in water-power production as they are in steam production.

Yet when all these cost items are balanced, it appears that whatever superiority water power has shown over steam power in the matter of cheapness during the past five years has been largely the result of the cheapness of capital as supplied by the government. Low returns to capital have been the determining factor in the reckoning.

A government whose objective is only the insurance of cheap and abundant power for its people might do worse than to consider such things as these.

A government which does not desire to become the sole owner and operator of the power producing and distributing facilities of the country will not put all the public's eggs in one basket by destroying private enterprise.

(*Continued on page* 64)

Farm Line Operating Experience During 1936

Presented at the Meeting of the Transmission and Distribution Committee, E.E.I., Philadelphia, January 22, 1937

By A. E. Silver

Ebasco Services Incorporated

AT the Edison Electric Institute Convention in St. Louis last June, the speaker outlined experience up to that time with the simplified type of farm lines being built with the advice of Ebasco Services Incorporated, by many of its client operating companies. These data may be referred to in the Edison Electric Institute BULLETIN of July, 1936. The present purpose is to bring down to date the more pertinent items of this operating experience.

Construction of farm lines by client companies has continued at a rapid rate. About 3300 miles were constructed by these companies in 1935, and about 5000 miles during 1936. Estimated construction for 1937 approximates the 1936 figure, although it may be somewhat less due to the steady thinning out of the prospective customer density in some territories.

Following is given a summary of operating experience, largely during 1936, of fourteen Ebasco client companies with recently constructed farm lines. These include nearly all the major client companies substantially interested in this type of lines. The results can be considered as representative for this group.

Mechanical Performance

Long span farm lines of light construction have given excellent performance on the whole. In some localities storms, which have done severe damage to conventional type lines and telephone lines, have had little effect on these new long span lines. Lines in Florida passed through two hurricanes with little or no damage. In Kansas, during a severe storm, a medium span copper line developed trouble, while a long span copperweld line stood up without damage.

About ten days ago, a severe glaze storm was experienced throughout a wide territory in Texas. Glaze is rare and lines in this territory are designed for light loading. However, very severe conditions were encountered during this storm. The radial thickness of the ice was more than one inch in some places, the maximum thickness about one and one-half inches. In the worst hit sections, steel transmission towers were crumpled and few lines of any kind stood up. As would be expected under such conditions, there were numerous breaks of farm line conductors, generally at splices. 4400-pound guys broke in numerous places and five-foot slugs were pulled up. Ridge pins were bent and ridge pin insulators broken. However, in the entire territory of one large client operating company, there were less than one hundred rural line poles broken, out of many thousands in service.

A few cases of miscellaneous difficulties have been reported, such as anchors pulling out of sandy soil, also interruptions where roads have been impassable due to floods. One company reported several failures of six-inch disc insulators due to bullets.

Vibration

A few conductor breaks in two situations from high frequency vibration of the smallest diameter solid conductors were mentioned last June. In a third situation, similar trouble has been experienced, with both fatigue and chafing in evidence. In one of the first two, it is now reported that the trouble has been cleared up by accurate sagging of the conductors. This experience has emphasized the difficulty (impracticability in some cases) of satisfactory sagging by sighting along the spans, and therefore the necessity for using a dynamometer.

Another important factor in controlling vibration effects seems to be the use of properly applied reinforcement at the insulator attachments. This is being studied.

In general, the results so far are reassuring in that vibration potentialities which caused some apprehension at the start apparently can be successfully dealt with by reasonable attention to sagging and to methods of attachment to supports.

One company, which has experienced no breaks, reports audible vibration (600 to 800 cycles) on steel wire lines. This is believed to be comparable to the familiar cold weather hum in telephone wires.

Farm Transformers

Fairly comprehensive data are at hand for 1936 from fourteen companies, on experience embracing something over 10,000 farm type, gap-protected transformers.

There were 98 failures in all, or approximately 1 per cent. These failures were divided as follows:

Lightning 24, or .24%.
Secondary short circuits 35 or .34%.
Overload 9 or .09%.
Incorrect connections and application of large over-voltages 4 or .04%.
Defective transformers (failed when placed in service) 2 or .02%.
Unknown and miscellaneous 24 or .24%.

Most of these transformers are of the 6900 and 7620 volt class. Seven of the twenty-four lightning failures were reported as bushing failures.

It is significant that the percentage of failures from lightning is less than one-fourth of the corresponding percentage for conventional transformers of this voltage class, both rural and urban, protected by lightning arresters interconnected with the neutral, as reported by five representative client companies for the year 1935, similar data not yet being available for 1936.

The failures from secondary short circuits were mainly on transformers not equipped with secondary fuses. Secondary protection has been or is being adopted by several client companies to minimize this type of failure.

Three of the miscellaneous failures were blown or broken internal primary fuses, without damage to the windings. In general, after some initial troubles, these internal fuses seem to be giving satisfactory performance. One company reports that one transformer shipment, having a faulty design of internal fuse, caused 50 cases of trouble (no damage to transformers), but this was recognized as an error in design and is being corrected by the manufacturer.

Spill Gaps

The above performance data indicate that spill gaps are giving excellent protection to equipment. Also experience to date indicates that, where combined with

rapid circuit opening and reclosure, interruptions from gap operations have not caused unsatisfactory service.

One operating company decided to add standard primary fuse cutouts on the line side of the spill gaps, on two circuits. It is understood that one of these circuits was without automatic reclosure, and the other was equipped with reclosing fuses, although the type and degree of coordination are not known. Many blowings of the primary cutouts were experienced with this arrangement.

Another company operated approximately 3000 farm transformers with original gap settings, and without arresters. Even though these circuits for the most part were not equipped with automatic reclosures, reasonably good service was maintained. On a relatively few of these transformers, tapped from three phase main cross-country lines and serving important loads, this company increased its gap settings and added lightning arresters.

Although the double type of spill gap was included in the initial design of farm transformers, some companies have purchased transformers with the single type of gap. While some trouble has been experienced from birds short-circuiting these single gaps, there has been almost no similar trouble from the double gaps.

One company, in a severe lightning district, cited experience on a single line serving 188 transformers. Sixty-eight units, or 40 per cent of these transformers, showed evidence of gap operation, all presumably due to lightning.

Circuit Reclosing Devices

In many territories, three-shot reclosing fuses, protecting branch lines, are giving satisfactory service in conjunction with spill gaps for transformer protection. Three cases have been reported of all three fuses being blown to cause service outage. A considerable number of reclosing circuit breakers are in use. Particularly those of the latest design are giving good results. One company reports some trouble from some of these breakers when load currents reach a value close to the tripping point. This sets up a chattering condition which injures contacts.

As representing extreme conditions, a company operating in a severe lightning territory reports data on a rural circuit 93 miles in length, controlled by an automatic reclosing breaker set for immediate reclosure on the first trip with 45 seconds and 2 minutes for the second and third trips respectively. During a portion of the year, this circuit chanced to be equipped with oscillographs, installed for other purposes, so that the occurrence of faults and performance of the breaker were recorded with considerable accuracy. During the 1936 season there were:

Total reclosures—272
Lockouts—7

Six of the lockouts were due to trouble on the line and one due to breaker control. During one lightning storm, the breaker reclosed 14 times in 32 minutes without lockout.

One hundred and nineteen of the operations were accurately analyzed from the oscillograph records, as follows:

Successful first shot	76%
Successful second shot	20%
Successful third shot	None
Lockouts	4%

Regardless of the very encouraging results being obtained with presently available reclosing devices—both circuit breakers and fuses—efforts should be continued to further improve and simplify a single pole, rapid-reclosing, self-restoring breaker for farm line duty.

Regulation

Most companies, using farm type transformers without taps, report no regulation difficulties so far. Such difficulties as have developed are mainly from high secondary voltage rather than low voltage. Very few boosters, or step regulators, are in service on the systems of these companies, but the number is expected to increase in the future as loads are more fully developed.

Secondary Protection

Secondary protection of farm type transformers is being found desirable by a number of companies, and the transformers are being so equipped rapidly. Ordinary fuses are giving satisfactory protection in most cases. Several types of fuses are being used, including ordinary cartridge fuses treated with weather resisting preparations. Some trouble has been experienced with secondary fuses of designs having the element under spring tension. These seem to open considerably more often than other types.

Transformers with secondary breakers incorporated in the design are being used in a number of cases and, in general, are giving satisfaction in protecting from secondary overload. A few cases of complaint are made that the breaker setting is too low. This may be due, in part at least, to the sensitivity of this type of breaker to unbalance of load.

Steel Wire

Seven companies report the use of galvanized steel wire of various types. With one or two exceptions the service period has been too short for reporting experience. No trouble, either mechanical or electrical, has been reported, even in those cases of longer experience.

Construction Methods

Most companies report nothing unusual in the way of construction methods for the long span construction. The use of gin trucks is reported in one case, and pole boring machines in another case. Nearly all companies make special effort to utilize the available labor, which is largely unskilled. Opinion on the use of farm labor is about equally divided. Some companies report very unsatisfactory results, and others report appreciable savings with reasonable satisfaction. Usually in the latter case, however, the farm labor is employed on regular construction crews under the supervision of competent foremen, rather than on an unsupervised piece-work basis, as is sometimes followed, such as in the digging of holes, or delivering of poles.

Right-of-Way

Partly as a matter of expediency, most client companies have been building their lines on public roads, or along highways where practicable. There are two outstanding exceptions to this, one of which is in a territory where the company has no rights to the use of public roads. In most cases where private right-of-way is utilized, permanent easements are obtained and legally recorded.

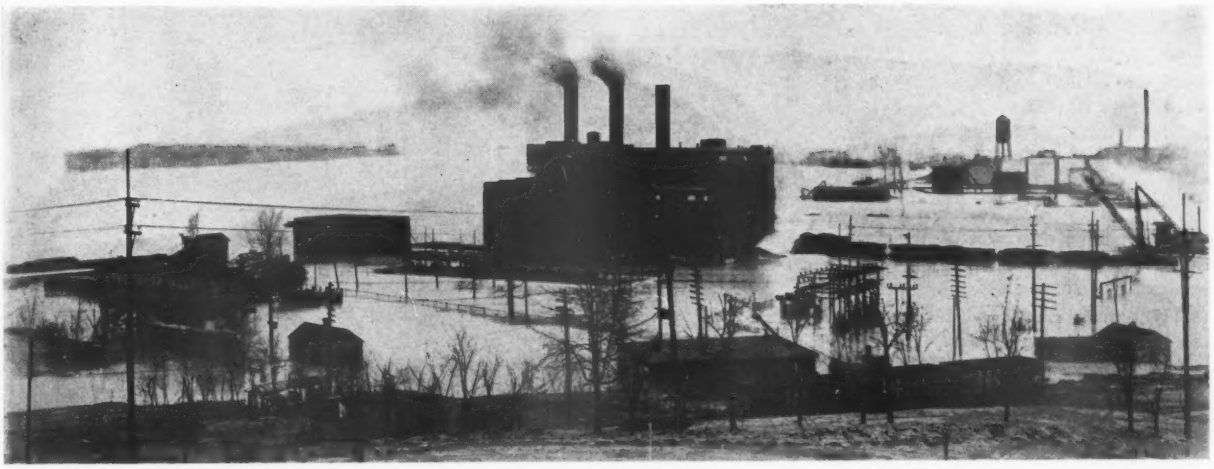
Communication Coordination

Coordination problems encountered in the case of independent telephone lines usually are largely due to such lines having ground return. For the most part a willingness to cooperate to establish the power service has been encountered. Usually each case, as it arises, is worked out on its specific conditions, by informal engineering conference, often on the ground. Practically all companies have encountered good cooperation in any problems with the Bell System companies.

Operating Methods and Maintenance

Practically all companies report that no special procedure has been adopted in operating and maintaining farm lines—that is, a similar procedure is used for such lines as for urban and other miscellaneous lines. Most of the lines under discussion are new and maintenance to date has been negligible. Due to the

(*Continued on page 64*)



View of Station from Reitz Hill—Jan. 31, 1937, River Stage 53.74

Electric Service as Usual in Evansville

Which Is Served by Southern Indiana Gas and Electric Company, a Subsidiary of The Commonwealth & Southern Corporation

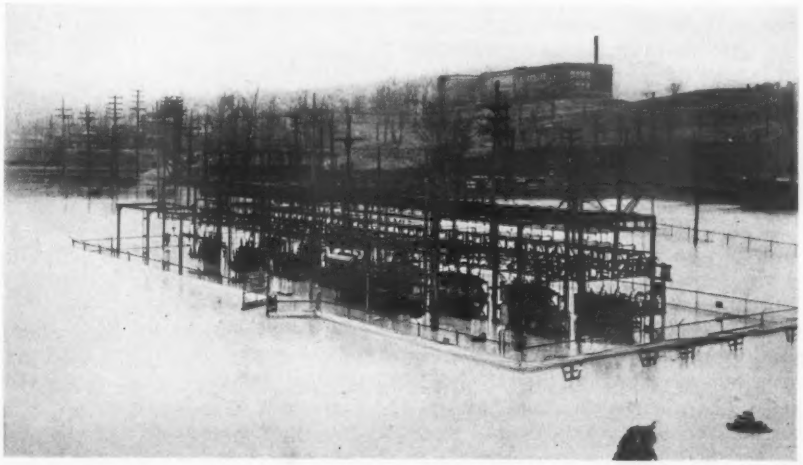
THE great flood on the Ohio River is not news; but the successful struggle to maintain electric service in the city of Evansville should not go unnoticed. Here a group of determined men, marooned in the power house, cut off from any contact with the city they were serving except by boat, met every rise in the predicted crest of the flood by creating new means to keep their plant in operation and maintain full electric service in the city at the higher flood levels.

The main generating station, serving Evansville, with 32,500 kw installed capacity, is located on a bluff high above the river. When this station was constructed, it was thought to be immune from any damage by flood. Its generating floor was built 7 feet above the high level of any previous flood of record. The station ordinarily receives coal by railroad cars which dump their load from hoppers into a track hopper pit, where it is elevated to the bins above the boilers. There is a smaller generator station located in the center of town which would carry some of the more essential loads, but which also receives coal in cars as used and discharges its condensing water into the city trunk sewers. It is from the basement of this smaller station that most of the circuits serving the city start. The city electric service depends on the operation of these plants as no interconnections of size with other power systems are available.

The flood, as is well known, was caused by unprecedented rainfall in the Ohio Valley. Twenty inches of rain fell in about twenty days, and this was far too much water for the river to carry away. The high water levels were accurately predicted by the United States Weather Department, days before they were reached. A crest was predicted 8 feet above any previous flood in history.

When the water reached 50 feet above the mean low water level, all railroad service was cut off to the main power station. The coal pile was under water and a scow and a floating crane operating a clam shell bucket was moved in on top of the coal pile. The track hopper pit was elevated and coal was recovered from under water. All contact with the city was cut off except by boat. The plant looked like an island in an inland sea. It was then expected that the plant could be kept in operation up to a level of 51 feet.

When the water reached 51 feet, the outdoor substation had been fenced in with canvas walls to protect it from wind and waves. All pot heads had



37½ kv Sub-Station, from Screen House—Jan. 31, 1937, River Stage 53.74

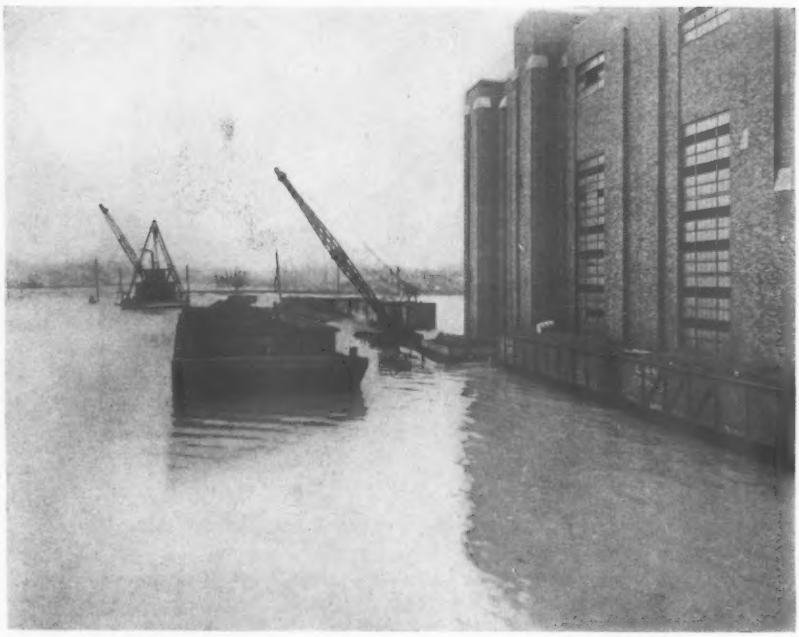
been repacked and taped and the plant was still in full operation.

When the water reached 52 feet, doors and other openings were barricaded, docks had been built, extra pumps had been installed to handle the seepage, and the plant was still in full operation.

When the water reached 53 feet, which is above the level of the generator floor, the plant was still in operation ready to serve full requirements.

When the water reached 53.74 feet, its crest, the plant was still in operation ready to serve full requirements. At this point the basement floor of the uptown plant failed and developed a large crack, letting in floods of water which endangered all switching equipment to the downtown area, but by moving in extra pumps, tired men kept the water from rising in this plant.

So the battle went on, for the crest of the flood did not pass for several days. The battle was won. The waters have receded and electric service had never been interrupted except in the flooded areas where it was ordered off by the military authorities. Street lighting, power, and domestic service had been maintained at all times, but this was not accomplished by sitting and watching the waters rise. It was accomplished by being ahead of the water at every stage. After the Pittsburgh and upper Ohio flood of 1936, the power plants in the area flooded were inspected by the supervisors in Evansville and plans were made to deal with a similar situation should it occur. The engineering department of the Commonwealth system was constantly in touch with the situation giving engineering advice on what might be done. Men from the operating departments of other properties of the Commonwealth system were dispatched to Evansville to aid in the emergency. Pumps and equipment were rushed to Evansville from the other properties of the Commonwealth & Southern system. These things were vital, but what won the battle was skillful supervision of the local managers and supervisors and the loyal, self-sacrificing, determined spirit by the men operating the plants and distributing system. The homes of some of these men were being flooded and their families were being moved out of town, but they stuck to the job, lived in the plant, in the office and the service building twenty-four hours a day, and never for one moment lost their confidence of success.



The Coal Hopper—Jan. 31, 1937, River Stage 53.74

Latest Annual Statistical Bulletin

(*Continued from page* 33)

vious year. Small light and power consumers used 15½ billion kilowatt-hours or 14 per cent over 1935. Residential users took 14,900,000,000 kilowatt-hours (or 16 2/3 per cent of the total) and agricultural service 2 billion.

In 1936 the unit use of coal for generating electricity by steam declined to a new low figure of 1.44 lb. per kilowatt-hour compared with 1.84 lb. a decade earlier and 8 lb. in 1892. In the last 15 years the amount of electricity produced with a given quantity of fuel was doubled.

Total taxes of the privately owned electric light and power companies for 1936 are not ascertainable because the effect of the Federal surtax on undistributed profits could not be determined until after the end of the year. Aside from the effect of this tax, the total is estimated to have been $266,000,000, an increase of $11,000,000 over the total tax on these companies for 1935. Federal taxes amounted to about one-third of the total taxes paid.

Taxes paid by privately-owned electric utilities represent an amount twice the cost of fuel, and three-fourths of the annual payroll.

"The post-war growth of electricity used in the home continued during the past year," the Bulletin states. "The annual residential use per customer in 1936 (excluding farms) was 719 kilowatt-hours, or 7 per cent above the 669 consumed by these customers in 1935. The annual revenue per kilowatt-hour for residence use continued downward to 4.69 cents, compared with 4.99 cents in 1935, or a decrease of 6 per cent. At the close of the year, the unit cost of electricity in the average home was 46 per cent below 1913, as contrasted with the cost of living which was 44 per cent above 1913."

"In 1926 the average residential customer paid 29.87 for 428 kwhr. In 1936 he paid about $33.72 for 719 kwhr. He is receiving 291 kwhr more per year and paying only $4 more for it. This increment cost for the additional energy is 1 1/3 cents per kilowatt-hour."

THE ELECTRIC LIGHT AND POWER INDUSTRY IN THE UNITED STATES

Statistical Bulletin No. 4

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Taxation and How It Affects Me

By Anne Glotzbach

This Paper Won the First Prize in a Contest Conducted Among the Employees of the Southern California Edison Company

I AM a typical and average American taxpayer.

My interest in taxation, however, is perhaps a bit keener than average, because for over eleven years I have been both breadwinner and homemaker for my family of three boys, now of high school age. These years have taken me through the boom period prior to the 1929 market crash, and the ensuing depression, and have affected me as a woman in the home and as the head of a family earning a living in the commercial world. My salary, according to figures recently released, is the average for wage-earners in California.

Like the typical American family, we have missed few of the worth-while things. We own our own home, modest but comfortable; we drive a small car; we have always had an abundance of reading material; we have managed many pleasant recreational outings at not too great a cost. And we have put aside a small sum for future needs.

All this has called for planning, budgeting, and rigid economy, which, until recent years, proved an exciting game. We had a goal that we believed we could reach, barring some major catastrophe. I was both grateful and proud that we were not only holding our own, but were slowly and surely attaining our goal. Now I am frankly doubtful, and here again, I proclaim myself an AVERAGE American.

I must admit that I was not at all tax-conscious a few years ago; perhaps I might even have been heard to say that taxes did not affect me greatly because my income was not large enough. I expected my property tax bill once a year, and was not greatly surprised if it showed a slight increase in rate. It was the constantly repeated "Have you a penny, please?" in connection with our California retail sales tax, that first brought tax-consciousness to me, and the penny or two or three often became a dollar or two, when an article of clothing or some other necessary item of greater value was purchased. Those amounts hurt. My

MRS. GLOTZBACH

budget was not flexible enough to permit such inroads into my salary without feeling the strain, which was already great because of the steady rise in living expenses. I wanted to know what I was getting for those pennies and nickels and dimes, plus the other direct taxes that I paid. I learned—and am still learning.

Just what is a tax? The dictionary defines it as "a compulsory contribution levied upon persons, property, or business for the support of government." It distinguishes a direct tax, "one paid at first hand by the owner of the thing taxed," from an indirect tax, "one in which the individual who pays in the first instance usually passes on the charge to someone else."

The purpose of taxes, therefore, is to support our Federal, State and local governments, which are primarily for our benefit and which must obtain their support from us, the people they serve. They pay for the many splendid services which we take for granted, such as our police protection, our army and navy, and for the fine public buildings, schools, parks, roads, highway and street lighting, that we demand. They have made possible our high standard of sanitation and public health. The benefits of government are legion, and no reasoning person can honestly minimize their value. BUT—HAS THE COST NOT BECOME TOO HIGH?

I ask myself whether I, as an average American, need be unduly concerned by the alarming rate of increase in taxes, and the rising cost of living. Emphatically, yes—for investigation of the tax situation reveals that I, and fifty millions of average citizens like me, are carrying by far the greater part of the burden.

Reams of statistics have been compiled and are available to the tax-paying public. They are confusing, just as trying to visualize a billion dollars is confusing. But to say simply that one-fourth of the average California wage-earner's salary—three months' pay—or about $360, was his share of the total cost of all forms of government in 1935, is more than clear. This amount was increased for 1936, and is still increasing.

My 1935 budget showed about $85 in real estate taxes; other direct taxes accounted for approximately $50 more. But $135 represents less than 40% of $360. How did the more than 60% creep in, when I had made no provision for it? In indirect taxes, for which I never received a bill at all, and which were concealed in the "cost of living."

Property and income taxes are the best examples of direct taxes. We know what the rate is and what amount we are paying. Our California 3% sales tax is also a definite quantity, as is the gasoline tax. But the 60% or more that we do not realize we are paying is attached to everything we eat, wear, use, or enjoy. Sometimes there are from fifty to several hundred taxes on one small item. Food, clothing, cosmetics, medicines, utilities, even the safety deposit box which we still optimistically retain—all carry their nearly endless train of taxes. Automobiles, which have become a necessity, may again join the luxury class, for $53 in taxes is a large amount for the aver-

age man to pay in one year, on a small car that he has driven only seven thousand miles. Of this amount the gasoline tax is visible—most of the rest is invisible.

And here we come to a consciousness of the insidious influence of indirect taxes on the lives and incomes of all of us. The average man and woman is not aware of turning over the pay checks of three months for the cost of government. For centuries, it has been the aim of politicians to extract money as painlessly as possible. How well they have succeeded—how insensible we have remained for years—is evidenced by the general disinterest in such a vital subject. It is human to be careless about anything that we feel does not concern us greatly. But when our pocketbooks are continually open to raiding by a greedy network of governing bodies (some 180,000 in all), on a "one for you and three for me" basis, of money that *we* have worked for, not they—well, that particular pain is potent enough to overcome even the mock-patriotic anaesthetic of the politician.

We appreciate our great, glorious country, its union of states, our beautiful cities; we know money is needed to maintain the standard of which America is justly proud, and that this money must come from us. We are willing to pay. But when unnecessary expenditures and squandering of our money reach the point where millions of citizens are staggering under a load that is fast becoming unbearable, a halt must be called. We are perilously close to socialism. Add another 10% to the 25% of income already being paid in taxes, and the United States shall have attained socialism, in reality if not in name. A sorry end, indeed, for a country founded on the principle that the dollar earned belonged to the person who earned it!

An outstanding example of the topsy-turvy reasoning of our governing and taxing bodies and their complete disregard for this principle is the folly of paying certain classes for the wanton destruction of food, as practiced under the AAA. Why should we supply money to pay bounties to farmers so that they will plow under much needed food, destroy cattle, reduce crops, and *we* stand the increased cost of the food we need because of its "scarcity"? What a vicious merry-go-round! Some of our politicians might well emulate the average housewife. She spends what she has, which at times is very little. She serves cheaper cuts of meat, or substitutes other protein foods for it, eliminates the delicacies that her family would enjoy, patches and makes over clothing—but always, if she is the truly average American woman, she derives her greatest happiness from the knowledge that she is making ends meet.

And what of the millions spent on the Matanuska project in Alaska, when we have vast areas of tillable land right here at home?

Even the excessive amount we are paying for current government is not enough to satisfy the demands of State and Federal governing bodies. During the last few years they have been operating under huge deficits. Expenses have run away from revenue, and IOU's, or state warrants, are being issued against taxes of the future to pay today's expenses. That means that besides paying for current expenditures, we are carrying a huge debt which we must pay off—and the only way is through taxation.

The people of California owe a public debt liability of nearly $4,000,000,000, which includes California's share of the Federal debt, the State debt, and the bonded debt of local governments. This amounts to $584.73 for each man, woman, and child in California. Bringing that to a purely personal basis, it means that my children and I today owe $2,338.92. What hope have we of ever paying that debt, when figures prepared by the Federal government prove the statement of John D. M. Hamilton, chairman of the Republican National Committee: "The government is spending $2.12 for every dollar it takes in through its taxing program." I doubt the miraculous qualities of governments to balance their budgets that way. It doesn't work with mine.

In Federal affairs we find even greater confusion. Our nation owes a national debt of $36,000,000,000. To understand the enormity of this amount, it would take 41 years to pay off this existing Federal debt if times were as good as they were during the 1920's, when the United States was more prosperous than it had ever been, and when tax collections were greater than ever before.

Of this incomprehensible amount, commercial and savings banks hold 18 billion in government bonds. This is borrowing, pure and simple, and excessive borrowing by the government inevitably ends in inflation of the currency—a leveling process which wipes out all values and forces everyone to start all over again. Unless we stop spending recklessly and pay our obligations, the credit standing of our nation will disappear and we shall become insolvent.

We all believe in the need for diversification of our investments. It is never wise to put all our eggs in one basket. Yet the government, by encroaching upon the functions of the banks, is forcing them to do just this. It has been well said, "Let us not forget that when the borrower dictates the policies of the lender, the business of the lender will be conducted in the interest of the borrower, and not in the interest of the lender."

And who, in the final analysis, is the lender? The stockholders and depositors who have entrusted their moneys to the banks for safeguarding. Our savings, put aside at very considerable sacrifice to provide the family nest-egg for a rainy day, schooling, etc., have either been used up due to the constantly rising cost of living caused by increasingly heavy taxation, or the returns on them have been reduced to a point where they fail to accomplish what we had hoped.

Government, far from content with the excessive taxes imposed on the average American, exacts its toll from the businesses which support the people. We get our money through business, which produces the only wealth there is. Government and politicians cannot create it—they can only spend it. My company alone pays an annual tax bill of $6,000,000—15% of gross receipts. The company is owned by people of average means; they, and the hundreds of thousands of consumers, will pay the bill if the company should be hopelessly crippled through excessive taxation. The company's bill is in itself alarming, but excessive consumer taxes place a limit on his ability to buy the service of the company, and the growth and extension of the company's service are accordingly slowed down. Everyone suffers as a result.

Can the tax burden be reduced? Yes, if fifty million Americans can be taught to think. Newspapers and magazines carry articles, stories, and editorials, day after day, setting forth the menace to us and to the nation. The prevalent belief that the rich pay taxes and the poor do not, is slowly but surely

(*Continued on page* 50)

Better Light—Better Sight in Chicago

By E. W. Lloyd
Vice-President, Commonwealth Edison Company

THE lighting activities of the Commonwealth Edison Company continued to expand rapidly in 1936. During the year the Company added nine more lighting salesmen and six engineers to its commercial and industrial lighting staff and doubled its home lighting advisor staff.

Also during 1936 three men devoting their entire time to promoting residential fixture sales were added, thus emphasizing improvement in permanent lighting equipment, as well as in portable lighting equipment. As a result of this particular activity, residential fixture sales during the last six months of 1936 increased 70 per cent over sales during the last half of 1935.

Promotional effort on portable equipment accelerated in 1936. Company sales of this type of residential equipment increased 49 per cent in 1936 over 1935, 59 per cent of the sales of all portable lamps were I.E.S. lamps as compared to 37 per cent in 1935. Another gratifying feature is the manner in which all of the more important stores have paid particular attention to the I.E.S. types of portable lighting equipment in 1936.

The Better Light-Better Sight activity is showing particularly good results in office lighting. The effects of the model offices set up in the Marquette Building, Monadnock Building, and the Conway Building have spread to most loop office buildings, with the result that employees are demanding better lighting and the management is becoming convinced that improved lighting is an advantage. Two large buildings just outside the loop, namely, the American Furniture Mart Building and the Merchandise Mart Building, have improved their lighting to such an extent that it has overtaxed the riser capacity.

A considerable advancement has been made in the use of mercury vapor lamps in industrial establishments. In ten of the more important jobs, a total of 493 such units were installed.

For particular industries there has been a considerable amount of development of new equipment by the company. In 1935 new equipment was developed for the printing industry which included imposing stone lighting, under-feed board lighting, and ink roller lighting. 1936 printing plant installations were:

MR. LLOYD

No. Jobs Sold		*No. Units Sold*
71		469
Merchandise	*Wiring*	*Kw*
$2,564.31	$931.99	54.7

Studies were also made of the cleaning and pressing industry, and new equipment developed for color matching in various industries. Meetings were held at the Chicago Lighting Institute to introduce these methods of lighting to representatives of the various companies interested. There were meetings for printers, cleaners and dyers, buffers and polishers, ink manufacturers, paint manufacturers, textile people, and others.

Contracts for New and Additional Business

Lighting salesmen secured the following business during 1936:

Number of new business contracts	2,335
Number of additional business contracts	5,162
Total number of contracts	7,497
Kw signed on new business contracts	7,864.6
Kw signed on additional business contracts	17,742.9
Total Kw signed	25,607.5
Average Kw per contract	3.41
Estimated monthly income	$101,509.58
Estimated yearly income	$1,218,114.96

The total kilowatts signed in 1936 was 25,607.5 as compared to 24,463.0 in 1935.

It is interesting to note that the average load per contract is higher than for 1935. The figures are, 1935 average 2.97, 1936 average 3.41 kw.

The increase was in the size of additional contracts rather than for new business, indicating that improvements are being made by present customers.

Industrial Lighting

The figures for industrial lighting sales were:

	Merchandise	*Wiring*	*Kilowatts*
1935	$18,507.64	$19,437.59	7,730.5
1936	38,338.07	34,271.81	9,858.7

Trial installations have proved to be the best means for selling, as shown by the records of the Illuminating Engineers. The following table shows the effectiveness of such trials in industrial plants.

No. of trial fixture demonstrations	332
No. of demonstrations sold	159
No. of demonstrations pending	97
Percentage of demonstrations sold	48%
Percentage of demonstrations pending	29%
Merchandise demonstrations sold through	$25,035.60
Wiring demonstrations sold through	$10,459.06
Kw load increased in areas involved	1234.8

Commercial Lighting

Commercial lighting sales were:

	Merchandise	*Wiring*	*Kilowatts*
1935	$66,238.87	$43,185.19	18,308.4
1936	111,837.42	51,947.63	20,417.2

The best means of selling to commercial customers was also found to be by trial installations together with plans prepared by the engineers.

No. of trial fixture demonstrations	193
No. of demonstrations sold	114
No. of demonstrations pending	26
Percentage of demonstrations sold	59%
Percentage of demonstrations pending	13.5%
Merchandise sold through demonstrations	$11,062.19
Wiring sold through demonstrations	$1,361.85
Kw load increased in areas involved	592.7

School Lighting

Continued to promote better school lighting in public, private, and parochial schools by means of surveys and complete plans and recommendations. During the past year 344 classrooms accommodating approximately 14,000 children were equipped with higher intensities of illumination. In the public schools, standards have been increased from 450 or 600 watts per classroom, which gives 2 to 5 footcandles of direct lighting, to 1800 watts per classroom, which provides 15 footcandles of indirect illumination, and represents an increase of 300 per cent in wattage. The lighting installation of the recently completed St. Gregory Parochial School indicates the trend in this group. Here six 300-watt totally indirect lighting units have been installed in all classrooms, giving 15 footcandles of illumination. The average existing condition is about 400 watts per classroom, giving 2 footcandles of direct lighting.

Engineers Lighting Recommendations and Layouts

The lighting plans and specifications for both commercial and industrial lighting jobs are important factors in the securing of new load, merchandise, and wiring sales. The engineers have endeavored to make a systematic survey of establishments which need improved lighting and to submit to the management written recommendations which can be followed when improvements are made. Business secured directly from such recommendations during 1936 follows:

Number of layouts	1755
Number of jobs sold	511
Number of jobs pending	389
Number of jobs increased	1081
Number of kilowatts increased	7315.8
Merchandise sold	$56,519.28
Wiring sold	$21,907.43

Architects' Service Bureau

A total of 153 architects and architectural firms and 97 builders, contractors, and realtors were contacted during 1936. 289 commercial and industrial prospects were handled, resulting in the specifying of 1012 kw over the architect's previous layout. There was a large increase in the number of residential jobs, 341 plans were handled resulting in an increase of 3410 outlets.

The Architects' Service Bureau supervised the erection and installation of air-conditioning equipment in four Kelvinator houses purchased by Edison employes. During the coming year test data will be compiled from records kept on these homes.

Lamp Renewal Activity

The activity to increase revenue by replacing burned-out lamps for residential, commercial, and industrial establishments was carried on in 1936. This activity has proved beneficial, since it puts into use sockets which otherwise would not produce revenue. The average order in 1936 was 455 watts; in 1935, 432 watts.

No. of orders for lamp renewals	155,492
Total No. of lamps renewed	1,245,595
Kw increase in lamp sizes	1,576 kw
Estimated increased revenue due to increased lamp sizes ($30.00 per kw per yr.)	$47,280.00
Leads secured for Home Service demonstrations	1,880
Leads secured for merchandise	1,097
Customers' Service tickets for repairs on appliances, etc.	2,028

Commercial and industrial salesmen renewed lamps as follows:

	No. of Orders	*No. of Lamps*
Commercial	5,154	50,468
Industrial	579	10,794

Another activity which was repeated for the second time and achieved considerable success was a series of meetings sponsored by the Company for all of its employes and their families on the subject of Better Light-Better Sight. A total of 24 such meetings were held in October, November, and December of 1936, with a total attendance of 7500, and the attendance would have been greater had there been a larger auditorium available. These meetings were held at the Chicago Lighting Institute. An hour and a half's program was given in the form of a series of skits, each dealing with some phase of lighting or lighting equipment, the main sketch being a sample demonstration of a Home Lighting Advisor's call at a home. Mr. Ralph G. Raymond, Manager of the Chicago Lighting Institute, acted as Master of Ceremonies and lecturer, and the other members of the cast were drawn from company Home Lighting Advisor and Sales staff. The meetings had a two-fold result, first, it created more interest in lighting among non-sales employes, second, it promoted employe good-will toward the Company.

Particular attention was paid to training of all lighting employes during the year. Both of the G.E.-LaSalle training courses for Home Lighting Advisors and the Commercial Lighting Salesmen were used during the year, as was also the Westinghouse text book.

The featured program for groups at the Chicago Lighting Institute throughout the year was a program entitled "Better Sight Through Better Light." The Institute was host to 54,447 persons during the year, the visitors coming from 35 states and 17 foreign countries. A general increase in interest in lighting among the public was evidenced by the increasing number of persons who made individual visits and requested assistance in solving lighting problems of their own. These requests for information covered all fields of lighting.

PRIZE AWARDS FOR 1937

Readers of the BULLETIN are reminded that entries for the H. M. Byllesby Prizes, the B. C. Forbes Prize, the A. L. Lindemann Prizes and the James H. McGraw Prizes must be forwarded to the Secretary of the Edison Electric Institute, 420 Lexington Avenue, not later than March 1, 1937, for consideration by the Prize Awards Committee.

Presentations of accomplishments for consideration for the Charles A. Coffin Award, the Augustus D. Curtis Award, the George A. Hughes Award and the Thomas W. Martin Award must be forwarded to the Secretary of the Institute not later than April 1, 1937.

Detailed information on the several awards for 1937 to be administered by the Prize Awards Committee of the Edison Electric Institute has appeared in the October and December, 1936, and January, 1937, issues of the EDISON ELECTRIC INSTITUTE BULLETIN.

Who Pays the Bill?

By J. H. Agee

Vice-President and General Manager, Lincoln Telephone and Telegraph Company

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At the last National Convention of the United States Independent Telephone Association, held the middle of October, last year, one of the very live topics which attracted a great deal of attention, particularly in the plant division, was the subject of inductive interference following the widespread program of the Rural Electrification Administration (R.E.A.).

Some interesting figures were presented. Mr. A. L. Stadermann, Chief Engineer of the Citizens & Independent Telephone Company, of Terre Haute, stated that in the first six months of 1936, 71,243 farms were supplied with electric service, making a total of 860,000 farms throughout the United States which were now using electric current. During the year the R.E.A. had approved loans in excess of $23,000,000 to various cooperative electric distributing companies throughout the country and under the program announced by the National Administration the ultimate goal would be to make electricity available to every farm in the country.

This intense development of electric distribution spells a good deal of trouble for the telephone industry, more particularly in those sections of the country where grounded telephone service is still predominant. Statistics are not available covering the number of rural subscribers in the United States who are being served with grounded telephones but probably a fair estimate would be that 50 per cent of the rural phones, including rural subscribers on the Bell System are still supplied with grounded service.

The subject of inductive interference is far from new. All telephone companies have been confronted with the problem of making their grounded lines metallic and providing proper balances whenever any power company energized a power line, whether for general transmission purposes from town to town or for the purpose of supplying rural subscribers with electric energy.

Heretofore the cost of converting a grounded line to metallic has generally been borne by the telephone company. Rates have been adjusted accordingly and the only item of cost which the power company has borne has been the cost of moving existing lines from one side of the road to the other or any other expense incident to such change which would properly be charged to maintenance or expense. The practice has not been to ask the power companies to make capital investments for the telephone industry.

However, the present program of rural electrification is on such a broad basis that it reaches the smaller communities, many of which are served by mutual telephone companies or companies with limited financial resources. Introduction by the power people of the use of uni-grounded or multi-grounded neutrals in wye-connected circuits in rural power and distribution lines has aggravated the amount of interference reflected in the grounded telephone lines. All over the country the smaller companies have rushed to their Commission asking for protection or relief from interference with their service.

Confronted with the fact that such partially grounded electric lines will actually make it impossible for the telephone companies to longer furnish grounded service, the immediate and primary question then becomes, "Who will pay the cost of 'metallicizing' and balancing the telephone lines?"

At the Convention in Chicago many answers were given to this question. The first one seemed to be, "Let the power companies pay the cost." In several states Commissions had already indicated their willingness to make such orders and in one case before the Nebraska Commission such an order had been issued and was being complied with by the power company. There seemed to be a majority opinion favoring that procedure.

Another suggestion was for the telephone company to pay the bill in the first instance and then spread the cost over a period of months to the subscriber, letting him reimburse the telephone company and after doing so, then to continue providing him with metallic service at a grounded rate.

Other suggestions were to divide the cost with the power company, playing the part of the big brother to the power company.

Regardless of the motives back of these suggestions, it seems to us that there is only one proper and sound solution to the problem and that is for every telephone company which operates grounded lines or lines with certain types of ground connections, such as push buttons on metallic lines, to do its own converting and make its own changes which affect the investment in telephone property. The reasons for this become apparent after a little study.

For example: Suppose the power company distribution system parallels one hundred miles of rural lines in a community with grounded telephone service. Assume $25.00 per mile is the cost of making the telephone line fully metallic. The total additional investment would be $2,500.00. If the power company pays this bill, it has contributed $2,500.00 telephone plant to the telephone company. How will the telephone company account for this on its books. Under the latest rulings of the F.C.C. this item must appear as a contribution to the company's property in account number 175. The company's right to make any charge for the use of that added property or to earn anything on the contributed amount is seriously questioned.

If the telephone company receives the investment as a contribution, must it provide the metallic service to its subscribers at the same rate which it previously provided grounded service? If so, is it discriminating between any subscribers who might continue to be served with grounded lines either on the same or neighboring exchange?

Assuming it is a gift, what will the tax assessor say about the value of the property owned by the telephone company at the next assessment period? When the lines goes down in a storm, is the power company going to replace it? Who is going to provide the money for depreciation and maintenance on the contributed property?

After all, if the power company pays for making your lines metalic, what

have you saved? Actually you have only saved the cost of money and while it is a considerable item in itself, on the basis of today's money market it is only one-fourth of the annual charges which the telephone company must meet in maintaining and providing service over metallic circuits.

In other words, unless you increase the rate to the subscriber even though the power company should pay for all of the immediate cost of converting your grounded lines to metallic, the day will come when you will have to replace this wire and have no money with which to do it and in the meantime you will have had to pay taxes and maintain the added plant from year to year.

What about the suggestion of letting the subscriber pay an added rate for two or three years in order to recover the investment and then provide him with metallic service at the former grounded rates? The answer is the same. Such a procedure would be unsound and unfair and, technically, illegal.

Of course we recognize that there are hundreds of small companies who pay no attention to annual charges, who give no consideration to replacement of their property until it is entirely impossible to render service with it, who keep no books other than to make a record of assessments and collections, and whose rates for service are not subject to regulation or control. In those instances, the power companies should probably pay the cost of the change and the mutual subscriber will not worry about the matters of depreciation and maintenance, but in the cases of larger companies, where capitalization is important and where the operation of the company has due regard to a reasonable return on its investment, it seems to us that the cost of "metallicizing" the lines or any other capital investment incident to protecting the telephone service from inductive interference should be borne by the telephone company and the annual additional cost reflected in the rate charged for telephone service.

When the Rural Electrification program was first announced and the cost of constructing rural lines in individual cases was submitted to the R.E.A. for approval of grants and loans, no amount was included for cost of reducing the effect of inductive interference upon communication lines. The protest which was received from the telephone companies brought this matter to a head rather quickly and we understand that the R.E.A. Board agreed that the local electric distributing companies could include in their estimates of construction costs, a proper amount to reimburse the telephone companies for making grounded lines metallic, but, as we have pointed out, this does not meet the annual charges which will immediately accrue and continue so far as the telephone companies are concerned.

If the electric companies are to reimburse the telephone companies for the continuing costs, it must be done by an annual payment of a sum sufficient to cover maintenance, depreciation, taxes, and any other item of operating expense, and these items should be paid by the power companies each year. Obviously such a suggestion is too cumbersome to be practical.

The only answer therefore, we repeat, is for the telephone company to make the necessary investment and adjust its rates so that it will be compensated for the annual charges.

In our opinion, the foregoing is the proper answer from an economic standpoint. The telephone company is charged with providing its subscribers with the best grade of telephone service. It can only do this by taking into consideration all costs and receiving sufficient revenue to meet them.

RECENT PUBLICATIONS

JOINT USE OF POLES TELEPHONE CIRCUITS AND 6.6 and 13.2 KV POWER CIRCUITS SAFETY FEATURES

E.E.I. Pub. E-4. Provisional Report 19 of the Joint Subcommittee on Development and Research of the Edison Electric Institute and the Bell Telephone System, 18 pages. Price 30c to members and their employees; 75c to non-members in the U.S.A.; 85c to foreign countries.

SPECIFICATIONS FOR THE CONSTRUCTION AND MAINTENANCE OF JOINTLY USED WOOD POLE LINES CARRYING SUPPLY AND COMMUNICATION CIRCUITS

E.E.I. Pub. E-3. A report of the Joint Committee on Plant Coordination of the Edison Electric Institute and the Bell Telephone System, 39 pages. Price 50c to members and their employees; $1.50 to non-members in the U.S.A.; $1.60 to foreign countries.

Another forward-looking step has recently been taken by the Edison Electric Institute and the Bell Telephone System in the program which these organizations have had under way for many years in their efforts to solve mutual problems involved in providing better power and communication facilities to the public.

A joint report (EEI Publication E-3) entitled "Specifications for the Construction and Maintenance of Jointly Used Wood Pole Lines Carrying Supply and Communication Circuits" marks this step. At the present time, there are five million wood poles jointly used in the United States, but those not intimately familiar with the engineering, construction and operating details usually fail to realize the amount of effort that was necessary to solve the many problems involved. The present report represents the results of an intensive study of the best present-day practice and provides for construction and maintenance which it is believed will prove of substantial advantage in the rendering of power and telephone service. They are designed to supersede a number of earlier specifications, among which are those known as A. T. and T. No. 4864 and the still earlier No. 4040. They take advantage of improvements that have been made in both power and telephone systems and some of the new materials which are available.

Closely related to these specifications is another report prepared from the joint activities of the two groups. Provisional Report No. 19 of the Joint Subcommittee on Development and Research of the Edison Electric Institute and Bell System (EEI Publication E-4) discusses a number of coordinative measures which have been developed for use in certain situations where joint use between telephone circuits and 6.6 and 13.2 kv power circuits is proposed. The report is based on detailed studies of experience and of specific cases where coordinated measures such as to make joint use feasible were developed. It is demonstrated clearly that the voltage of the power systems is not the determining factor in itself, but that the safety of joint use depends also upon the following:

1. Frequency of occurrence of contacts between power and telephone circuits.
2. Voltage which might be impressed on the telephone plant in the event of an accidental contact with the power wires.
3. Possible duration of voltages on the telephone plant following an accidental contact.
4. Possible current in the telephone plant following an accidental contact.

Applications of various available coordinated measures discussed in this connection provide a sound basis for determining if joint use should be entered into with higher distribution voltages in specific instances.

A Brief Discussion of Radio Fundamentals from the Standpoint of Public Utility Use

By G. H. Underhill

This article is designed to present fundamental factors necessary in the consideration of the use of communication with mobile units as discussed on January 20 by the Transmission and Distribution Committee.

TO intelligently consider space radio as a possible means of communication with mobile public utility units, a working knowledge of the technical features and operating characteristics of the several available systems is essential.

Fundamental to this knowledge is an understanding of the action and the susceptibility to foreign influences of the various frequencies which may be utilized. Fortunately, the practical requirement in utility service of universal coverage within the transmitter radius, permits the limitation of the discussion to one of the two components of the wave normally radiated by a radio transmitter. This is the "ground wave" which follows the surface of the earth and which is attenuated without fading effects to a practical minimum value within a relatively short distance. (The second or "sky wave" is radiated at an angle of some degrees above the horizontal and upon striking the mirror formed by the ionized Heaviside Layer, may be reflected back to earth to provide a strong signal some hundreds of miles from the transmitter but with a "dead spot" intervening. Due to variations in the reflecting layer, sky waves are frequently subject to severe fading.)

Ground waves are subject to several influences which, within limits, cause their practical range to vary inversely as an exponential function of the frequency. At about 30,000 kc the range has decreased to approximately optical limits and while the field above 30,000 kc. has by no means been fully explored, the practical range does not appear to decrease further as the frequency is increased. Fundamentally then, the lower the frequency, the greater the area covered by the ground wave.

In considering this relationship, however, a number of important, modifying influences must be kept in mind.

1. Consideration of any radio frequency below 2500 kc appears to be futile because of present assignments.

2. Frequencies above 30,000 kc are practically free from natural atmospheric disturbances (static) of all kinds and may be successfully operated through summer storms which might easily result in complete disruption of service on the lower frequencies.

3. As the frequency is increased the problem of auto-ignition interference becomes quite formidable; not from the radio car or truck, which can be effectively suppressed, but from all cars operating in the immediate vicinity of the receiver. This interference reaches its maximum severity in the neighborhood of 40-45,000 kc, decreasing in intensity as the frequency is varied either upward or downward from that value.

4. The coverage of the ground wave of frequencies above 30,000 kc is practically independent of seasonal and diurnal variations which, however, materially vary the ground wave limits of the lower frequencies. In other words, once the coverage limits of the ultra high frequencies (above 30,000 kc) are established, reliable communication is assured under all conditions, whereas the coverage limits of the lower frequencies, although greater in extent, are not fixed from day to night or from season to season.

5. The quasi-optical character of the ultra high frequencies acts to advantage in areas close to the transmitter (say up to 5 miles), as multiple reflections from structures, buildings, and earth formations provide good signals in locations where medium high frequencies would hardly penetrate. In the more remote areas, however, this feature is a disadvantage as it creates shadow effects or weak spots behind any large bulk, which are not apparent on the medium high frequencies.

6. Since the sky wave of ultra high frequencies is only reflected back to earth under very unusual and infrequent circumstances, practical freedom from interference from remote transmitters operating on the same frequency is assured. With the lower frequencies, however, serious interference from reflected sky waves of remote transmitters is almost certain to occur and satisfactory operation under all conditions may prove most difficult, if not impossible. With a limited number of frequencies and widespread use, the problem of inter-company and inter-utility coordination would become most formidable.

7. Since the physical dimensions of the fundamental form of transmitting antenna structures are inversely proportional to the frequency employed, the use of frequencies below 30,000 kc for mobile transmitters becomes increasingly impractical. (At 30,000 kc the smallest practical antenna is approximately 8 feet in height, while at 5000 kc it would be something over 40 feet.)

8. Because of the compact antenna structures possible on the ultra high frequencies, close control of the direction and intensity of the transmitted wave can be easily secured. To a material degree, this flexibility can be utilized to overcome the optical range limitations of these frequencies.

As a practical matter, many of the above conditions are subject to further modifications as transmitter power and receiver sensitivity are varied, but these variables need consideration principally in the economic phases of the problem, and are not fundamentally concerned in any determination of frequency.

To sum up the frequency situation, it is convenient to establish a dividing line (which is by no means clearly defined) between the medium high and ultra high frequencies at 30,000 kc. On this basis the above data may be tabulated as follows:

	MEDIUM HIGH		ULTRA HIGH	
	Signal Strength		Signal Strength	
	High	*Low*	*High*	*Low*
Interference				
Atmospheric	moderate*	serious*	absent	absent
Auto Ignition	absent	moderate	moderate	serious
Other Stations	moderate*	serious*	absent	slight*
Coverage				
Diurnal	uniform	variable	uniform	uniform
Seasonal	uniform	variable	uniform	uniform
Antenna				
Physical Size	large		small	
Field Pattern Control	difficult		simple	

*May vary widely, depending upon conditions.

It may be appreciated from this rough summary of the frequency situation that the selection of a satisfactory radio communication system requires a most careful examination of the extent, shape, topography, and economic character, both of the complete territory to be covered and of its component parts.

The medium high frequency system

has the decided advantage that the transmitter location is not an all-important factor in obtaining coverage. Use may therefore be made of existing structures and the control problem is materially simplified.

On the other hand, to obtain the advantageous operating features of the ultra high frequencies, elevated antenna locations are essential. Where this location is remote from populated areas, on a nearby mountain top for example, the problem of the *reliable* supply and control of the transmitter is a serious one. One possible solution which avoids the possibility of storm failure of communication control lines is the full control of such a transmitter from headquarters over a beam channel operating at some frequency above 60,000 kc. This method is being seriously considered by at least one utility at the present time.

If the territory is extensive or mountainous and full coverage is essential, it may be necessary to resort to the use of multiple transmitters. It is obviously advantageous to operate all mobile receivers on a single frequency, but the operation of several adjacent transmitters on one frequency may create a difficult interference problem and may necessitate the centralized control and non-simultaneous operation of the several transmitters.

Two-way operations introduce additional factors requiring special treatment. Ultra high frequency mobile transmitters, unless spotted at high elevations, are generally limited to a four to five-mile range. If complete talk-back coverage of an extensive area is contemplated, it is obvious that a number of fixed receiver locations must be provided to pick up remote mobile transmitters. While rapid progress is being made toward a satisfactory solution, the centralizing and switching of the speech output of these remote receivers is at present not only initially costly, but a difficult and expensive operation to maintain.

Study of these conditions, which are outlined not as obstructions to the application and use of space radio, but merely as features to be considered and pitfalls to be avoided, should indicate the need for a thorough and painstaking technical investigation prior to any final decision. Without attempting to present more than rough data for comparative purposes, the following figures may be of assistance in setting up the economics of any local situation.

	Medium High	*Ultra High*
Typical Avg. Transmitter Power Output	1 Kw.*	150 W.*
Reliable Range (Subject to wide variations due to local conditions)		
Day	35-75 mi.	5-20 mi.
Night	75-250 mi.	5-20 mi.
Cost Data**		
Transmitter		
fixed	$12,000-$15,000	$5,000
mobile	—	750
Receivers		
fixed	$ 150	$ 225
mobile	150	225

*The wide difference in the transmitter powers given is due to the fact that optical limitations on the ultra high frequencies make uneconomical any attempt to increase range by increasing power. An ultra high frequency, 150 watt transmitter will normally provide a good workable signal at the optical limit whether it be 5 or 50 miles. On the medium high frequencies the greater range of the ground wave necessitates the higher power, if a usable signal is to be provided at the range limit under normal atmospheric and interference-free conditions. The value of 1 Kw. could be decreased for smaller areas and should be increased (if allowed by the F.C.C.) under unfavorable operating conditions.

**Includes
Antenna, Apparatus, Installation labor, Overheads.
Excludes
Transmitter site, housing facilities, power supply. Remote control circuits longer than 250 feet.

Taxation and How It Affects Me

(*Continued from page 44*)

giving way to tax-consciousness and interest in governmental affairs.

There are four outstanding obstacles to the reduction of the tax burden which must be removed, before we can earnestly set about solving the tax problem itself:

1. We look for new sources of revenue, instead of trying to curtail services of government where possible.

2. We demand too much service from the government. If we express that demand or desire through a majority vote, then a governing body is powerless to do anything but boost taxes to provide those additional functions. Unthinking citizens vote item after item of fixed expenses into government operating costs; they vote enormous bond issues with no thought of the consequences to themselves.

3. Economy is usually considered a fine thing—for somebody else.

4. Each body affected by a certain tax is inclined to brand it as inequitable and try to put the burden on another class.

There is only one body in the United States with the power to reduce taxes, and that is the voting public. It is no credit to Americans that an election can bring out only a relatively small percentage of the total registered voters. It is no credit to the other thousands who care so little about their right that they will not even register. What a blight on our generation if we are to be responsible for plunging the nation into such a maze of debt that generations to come will point a finger of scorn at us, their ancestors, for destroying the freedom to which they are entitled! It has taken back-breaking labor, stark economy, and wars to make America the great republic that it is. Our fathers appreciated freedom, suffered and fought for it, and felt well repaid.

Must I, through my own indifference, see my children grow up into an era of doubt and worry and even socialism? I have hoped and sacrificed for them, just as every other parent of this age has done. More than anything in the world, I want them to face the world fearlessly and with heads held high, proud of their country, their government, and of *me*. If, through my lack of interest, I play my part in passing on to them an increasing debt and burden of taxation, why should they not resent it? I do not want to leave that sort of "unfinished business" as their heritage. America belongs to them—it must be kept free for them.

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Seventeen Recent Awards of Edison Electric Institute Medals

SEVENTEEN Edison Electric Institute Medals for Resuscitation by the Prone Pressure Method have been awarded to employees of member companies of the Institute during the past twelve months. Four of the Medals were awarded in Pennsylvania, two each in Alabama, Indiana, New Jersey and New York and one each in Georgia, Maryland, Mississippi, Texas and Virginia. Several Medals are pending presentation and the data on other cases are being considered by the Judges, Mr. E. W. Gorry, Consolidated Edison Company, Chairman.

The Edison Electric Institute Medal was established by the Board of Trustees of the Institute in 1933 as an award to employees of member companies who have successfully resuscitated, by the Schafer Prone Pressure Method, individuals suffering from electric shock. The award is intended to serve both as recognition of the performance of the act and to encourage and maintain interest in the training of employees in the use of the Schafer Prone Pressure Method of Resuscitation.

A certificate describing the service rendered and signed by the president of the Institute is awarded with each Medal. In some cases where a Medal has been awarded, a certificate of assistance has also been awarded to those who have rendered valuable aid in the resuscitation. Recently, provision has been made to award small replicas of the Medal to those who have assisted.

In addition to their significance as well-merited tokens of humanitarian accomplishment, the Medals have a historical and sentimental value in that they have in their composition copper from the original mines laid down in New York City by the late Thomas A. Edison. This copper was part of the first underground system in the world for supplying current for electric light and power.

The names of the recipients of the Medals and brief statements of the circumstances leading to the awards follow:

EDWARD BURT
New York

On Sept. 24, 1934, Edward Burt and William Waldron, operators at the Granby No. 1 plant of the Fulton Light, Heat and Power Co., Fulton, N. Y., were engaged in washing the interior walls of the substation during a period of shutdown because of low water conditions. Samuel Harding, Chief Operator, in charge of this work, left the station for his lunch at noon, with instructions that Burt and Waldron continue the work until water conditions improved enough to permit the plant to resume operation.

At approximately 12:45 p. m. Burt had occasion to attend to some operating duties in a substation nearby, and during his absence Waldron came in contact with a fuse clip of a potential transformer behind the switchboard, and was rendered unconscious. Burt returned in about five minutes and found Waldron slumped behind the switchboard. He immediately started resuscitation, continuing for about five minutes until Waldron regained consciousness. Burt then telephoned Harding who arrived promptly at the scene. Waldron was then removed to a local hospital for further treatment.

The presentation of the Edison Electric Institute Medal to Mr. Burt was made June 10, 1935, by Mr. R. W. Porter, President of the Company, at the regular monthly meeting of the Safety Committee of the Oswego District, held at the offices of the Peoples Gas and Electric Company of Oswego, N. Y. Local papers published full details of the presentation ceremonies.

JAMES C. FLOOD
New York

On November 14, 1934, a group of high tension distribution feeders opened automatically. It was necessary to "proof-test" these feeders in order to determine which was faulty. Leopoldo G. Reggiani was one of the several field operators who were assigned to do this work.

In the course of the tests, Reggiani came in contact with the test lead charged with approximately 20 kv, at a point where two sections were joined together with a swivel connector. He received a shock which rendered him unconscious, and he fell to the floor upon the lead. The circuit was immediately cut out by fellow employees, and James C. Flood, identified with The United Electric Light & Power Company, started resuscitation at once, and continued for about 3 minutes when the injured man showed signs of life, and for about 3 minutes more when he breathed without assistance.

Mr. Robert B. Grove, Executive Vice-President of The New York Edison Company, Inc., presented the Medal to Mr. Flood on March 10, 1936, at a meeting of The

Left to right: L. C. Rochford, E. Burt, R. W. Porter, President, Fulton Light, Heat and Power Company, presenting Medal, and J. E. Lanigan

Transmission General Utility crew, Pennsylvania Power & Light Company

Association of Employees of The New York Edison Company, Inc., with approximately twelve hundred persons in attendance.

TRANSMISSION GENERAL UTILITY CREW

Pennsylvania

On July 10, 1935, a 16-year old youth, Leo Cragle, was standing on the tracks of the Laurel Line right-of-way in Wilkes-Barre, Pa., observing the flood conditions of the Susquehanna River. In a manner unexplained, one foot came in contact with the third-rail, allowing 600 volts dc to pass through his body, causing him to fall unconscious across the power and running rails.

An unidentified citizen removed the unconscious boy from this position by hooking the body with a walking cane, and carried him to a point near the River Substation of the Pennsylvania Power and Light Company.

A transmission general utility crew consisting of Andrew Carr, general foreman, August McHugh, Frank Carr, F. J. Shovlin and Joseph Dezagottis was stationed at this location. Andrew Carr immediately applied the prone pressure method of artificial respiration, and after 5 minutes work was relieved by Frank Carr, who continued for about 3 minutes more, when Cragle breathed without assistance. Meanwhile, McHugh, Shovlin and Dezagottis gave supplementary aid in dressing the boy's burns and in stimulating his blood circulation. He was then placed on a company truck and removed to a local hospital for further treatment.

The Medal and Certificate were presented to the Crew on May 18, 1936, at 8 p. m., at an employee gathering and entertainment held in the Hazleton Service Depot Auditorium, Hazleton, Pa., at which about 400 employees were present. Mr. N. G. Reinicker, Vice-President and General Manager, of the Pennsylvania Power and Light Company, Allentown, Pa., was the presiding chairman of the meeting and made the presentation.

CLAYTON H. SEYMOUR

Alabama

On August 27, 1935, a tree-trimming crew of the Alabama Power Company was at work in Florence, Ala. The crew consisted of four workmen and one foreman. Each of the men selected a tree to prune, while the foreman left the scene of the operations for a short period of time, and during his absence M. P. Wood, a member of the crew, came in contact with a 2300 volt line while engaged in the pruning work. The shock caused him to fall from his position, but his descent was retarded by tree limbs and his lifeline.

C. H. Seymour, another member of the crew, immediately applied the prone pressure method of resuscitation, and after about five minutes, the injured man breathed without assistance. Meanwhile the foreman returned, called for an ambulance, and had Wood removed to the hospital for further treatment.

The Institute Medal was presented last year by Mr. R. H. Mangum, manager of Publicity, before a divisional gathering of employees. Considerable publicity on the occasion appeared in the local newspapers.

GENERAL GORDON BURGESS

Alabama

On September 10, 1935, a line crew of the Alabama Power Company was engaged in making alterations to an overhead street lighting circuit in Montgomery, Ala.

The work required the crew to divide into two groups, each working on a different pole. J. R. Gifford had completed his work aloft, and was removing the rubber protective hose from the overhead wires. He removed all but one hose, the last one requiring him to alter his position on the pole, and in so doing, he unfastened the strap of his safety belt. He climbed down one tier of the cross-arms, and was about to fasten the strap of his belt, when he lost his balance and leaned against a live wire carrying 2300 volts. He toppled from the pole and struck a cable reel on the ground.

General Gordon Burgess who was clearing up on the ground, immediately went to Gifford's assistance, and applied the prone pressure method of resuscitation. He sent another employee to phone for help, and directed a passing motorist to summon the remainder of the crew from a pole some distance away. In about 8 minutes Gifford breathed without assistance, and was placed in an ambulance for removal to a local hospital for further treatment. Three members of the crew accompanied the injured to the hospital in the event that further resuscitation might be required.

Formal presentation of the Medal to Mr. Burgess will be made shortly.

THOMAS L. SELF

Georgia

On September 27, 1935, H. D. Sturdivant, district manager, and T. L. Self, a helper, were changing transformer taps in an outdoor substation of the Georgia Power Company, located in Senoia, Ga.

In removing the transformers from service, Sturdivant ordered Self to open a remotely operated disconnect switch. One of the blades of this switch failed to open, and when Sturdivant started to change the taps, received a shock of approximately 22 kv which rendered him unconscious. Sturdivant fell on the top of one of the transformers, and it was necessary for Self to use his trouser belt to remove the injured from that location. Placing Sturdivant on the ground, Self applied resuscitation, and dispatched an unidentified Negro for medical

James C. Flood

John F. Bonnett

aid. The injured man breathed without assistance in about 15 minutes, and after receiving first-aid treatment, was removed to a local physician's office.

Mr. W. E. Mitchell, vice-president and general manager of the Georgia Power Company, presented the Medal and Certificate to Mr. Self on April 17, at the Columbus Division operating practices meeting in Americus, Ga.

JOHN F. BONNETT
Pennsylvania

On August 10, 1935, a line crew of the Glen Rock Electric Light and Power Company, Glen Rock, Pa., was engaged in the transfer of a dead 13.2 kv line from an abandoned pole to another one previously erected, at a location west of Seven Valleys, Pa.

There was a live 4.6 kv line beneath that which was being rearranged. Stuart R. Koller, one of the crew members, was working aloft of the pole, when the guy cable of the old pole was detached from the ground anchor by other members of the crew. This cable came in contact with one of the live wires of the 4.6 kv circuit at a time when it rested against Koller's right knee. This caused a circuit through his body from the point of contact to his right hand, which was grasping a grounded conductor of the 13.2 kv line, resulting in a shock which rendered him unconscious.

He was lowered to the ground by the remainder of the crew, and given artificial respiration immediately by John F. Bonnett, the foreman in charge. A physician was summoned who administered the necessary medical treatment after Koller regained consciousness. Koller was then taken to his home for further treatment and rest.

The presentation of the Edison Electric Institute Medal and Certificate to John F. Bonnett and Certificates of Assistance to Millard Koller, Harry Baublitz and Joseph Newcomer, employees of the Glen Rock Electric Light and Power Company, was made at a dinner safety meeting in the Community Hall, on the evening of May 8, 1936. The presentation of these awards was made by Mr. J. E. Wayne, president and general manager of the Company. There were approximately one hundred and fifty in attendance.

Left to right: A. N. Cartwright, Vice President, West Penn Power Company, presenting awards to C. L. Taylor, Charles E. Hunt, Romie Goff and Victor D. Rippey

MAX C. PETERS
New Jersey

On September 30, 1935, Max C. Peters, an electrical foreman in the employ of the Public Service Electric and Gas Company, and a crew of men were working in the basement of a building at 10 North Warren Street, Trenton, N. J.

At the same time John C. Soriero, an electrical contractor, was making alterations to the secondary (120 volt) wiring in a drug store in the same building. The job which Soriero was performing required him to lie on the floor, and in the course of this work he received a shock which rendered him unconscious. The store clerk found him prostrate, and he called Peters from the basement. Peters first had his men shut off the electric service, and he then immediately applied resuscitation. A customer in the store called the First Aid and Police Departments who responded at about the same time that the injured breathed without assistance. He was removed to a local hospital in the Police ambulance, for treatment of his burns, returning to his work later in the day.

Mr. John M. Orts, director safety education, presented the Medal and Certificate to Mr. Peters on Monday, March 9, 1936, at a meeting in the Public Service Terminal Auditorium, Newark, N. J.

ISHMAEL HOWARD
Mississippi

On September 17, 1935, D. J. Jones, colored, was engaged in removing broken twigs from the streets in Purvis, Miss., following a storm. In his work he grasped a fallen wire which was charged with 2300 volts, and then fell unconscious to the street, with the wire still in his hands.

A repair truck of the Mississippi Power Company, which was patrolling the overhead lines subsequent to the storm, stopped at the accident, and Ishmael Howard, an employee of the Company, removed the live wire from Jones' grasp and applied artificial respiration immediately. In about 5 minutes the injured man showed signs of life, and 7 minutes later breathed without assistance.

Jones was given first-aid treatment at the scene, and removed in the company's truck to the doctor's office for further treatment.

Mr. Howard was presented with the Medal on May 27 at a divisional meeting of the Mississippi Power Company employees held in Hattiesburg, Miss., with Mr. H. L. Welch, district manager, in charge.

Max C. Peters

Edward Malloy

CHARLES E. HUNT
Pennsylvania

On August 15, 1935, during the rearrangement of overhead lines in the township of Windsor Heights, W. Va., Ivan R. Munce, an employee of the West Penn Power Company, ascended a pole to perform the necessary switching in order to place the new line in service. While attempting to fasten his safety belt around the pole, his right shoulder touched against a live wire causing him to lose consciousness and fall 25 feet to the ground.

Charles E. Hunt, another employee of the company, who was working at an adjacent pole rushed to his aid, and applied resuscitation immediately. He was relieved in this work by Romie Goff who continued until Munce breathed without assistance. The immediate assistance of a physician was not available so the injured man was removed in a company owned truck to a doctor in

William A. Linton is presented with Medal by Herbert A. Wagner, President, Consolidated Gas, Electric Light & Power Co.

Wellsburg, W. Va., five miles distant. There he received first-aid treatment, and was transferred via ambulance to Washington Hospital for further treatment. On these trips he was accompanied by Hunt and C. L. Taylor who were ready to perform further resuscitation if required.

The Edison Electric Institute Medal was presented to Mr. Hunt and Certificates of Assistance to Romie Goff, Victor D. Rippy and C. L. Taylor by vice-president, A. N. Cartwright, at a luncheon meeting tendered them on Friday, June 12, 1936, at the Metropolitan Club, Pittsburgh, Pa. A number of executives were in attendance as well as other employee members of the line crew who witnessed this case of resuscitation. Publicity was given the presentation of the awards in the local newspapers.

WILLIAM A. LINTON
Maryland

A line crew of the Consolidated Gas, Electric Light and Power Company of Baltimore, Maryland, were engaged on June 1, 1936, in the installation of pole transformers, guy wires, etc., at Mayo, Maryland.

During this work, Walter B. Smith, Jr., a lineman, came in contact with an overhead wire while removing protective line hose which had been placed for protection while working aloft on the pole. The voltage to ground was approximately 2400 volts. Smith was alone on the pole when the accident occurred, and his body slid to the ground head-downward, causing his head to become buried in the loose sand at the foot of the pole.

William A. Linton, a chauffeur assigned to work with this line crew, was in the truck writing work reports, and was one of the first to reach the injured man. He placed a blanket on the ground while the other men unfastened the injured lineman's safety belt and he then started application of the prone pressure method of resuscitation. In about five minutes, the injured man showed signs of life, but resuscitation was continued for about forty minutes longer, when Smith breathed without assistance. An ambulance, which had previously been summoned, arrived at about this time. Smith was given first-aid treatment on the scene and then removed to the hospital.

At an employee association event held on the evening of October 3, 1936, with approximately 1500 persons in attendance, Mr. Herbert A. Wagner, president, Consolidated Gas, Electric Light and Power Company of Baltimore, presented the Medal to William A. Linton.

EDWARD MALLOY
Pennsylvania

A line crew of the Philadelphia Electric Company were engaged in revamping the metering equipment at an automobile plant in Ardmore, Pa. The work required handling overhead wires having a potential of approximately 2300 volts to ground.

During the course of this work, Walter T. Brown, who was in charge, ascended a steel structure to inspect the work and to make some minor adjustments, thereby coming in contact with one of the conductors. The shock rendered him unconscious, and he fell to the ground, whereupon his men carried him a short distance away to a spot more suitable for resuscitation.

Edward Malloy, an electrical mechanic's helper, was the first to apply the prone pressure method, and was relieved in turn by Norman Mickley, Warren A. Yost and Ralph Wack. In about 30 minutes the injured man breathed without assistance, and was given first-aid treatment for his burns by a local physician. He was later removed to a hospital for further care.

Mr. H. B. Bryan, vice-president of the Company, presented the Edison Electric Institute Medal to Malloy and Certificates of Assistance to Mickley, Yost and Wack, on December 19, 1936, at a gathering of employees in the Masonic Hall, Ardmore, Pa. The local newspapers carried news articles describing the presentation.

W. J. BOYETTE
Virginia

On March 9, 1936, a line crew of the Virginia Electric & Power Company were removing a pole adjacent to an outdoor transformer installation. It was necessary to first lift the pole from the cavity in the ground, rest it against a building wall, and then lower it to the ground.

It was while the pole rested against the wall that W. M. Dilling was directed to rearrange the rope sling for the final operation. He ascended another pole which supported the transformer platform, when his head came in contact with a wire having a potential of approximately 6600 volts to ground. The shock caused him to lose consciousness and fall to the ground, a distance of about 10 feet.

W. J. Boyette, who was acting foreman on the job, immediately applied resuscitation to the injured man, while U. Bruce Dixon rushed to the truck in order to get the first-aid supplies. C. H. Nance assisted materially in the supplementary treatment, pending the arrival of a physician. Dilling responded to the efforts of resuscitation in about seven minutes, and after receiving the customary medical attention at the scene, was taken to a hospital for further care.

Formal presentation of the Edison Medal to W. J. Boyette and Certificates of Assistance to his associates, U. B. Dixon and C. H. Nance, was made at a dinner given in their honor at the Elliott Hotel at Suffolk, Virginia, on the evening of October 22, 1936. The awards were made by Mr. R. J. Throckmorton, vice-president of the Company in the Norfolk Division, in the presence of approximately fifty guests, including the mayor

Left to right: C. H. Nance, A. B. Dixon, W. J. Boyette and R. J. Throckmorton, Vice President, Virginia Electric and Power Company, presenting Medal

Ishmael Howard

B. J. Jones, Jr.

of the city, Red Cross officials, company executives and fellow employees.

WILLIS M. COX
Indiana

On July 26, 1936, two employees of the Public Service Company of Indiana, Willis M. Cox, foreman, and Lester L. Shobe, electrician, were dispatched to replace blown fuses on 2300 volt distribution circuits at the Bruceville Indiana Substation.

The routine involved first bridging the blown fuses with cable jumpers. Shobe held one end of the jumper while Cox fastened the other end adjacent to the blown fuse. In some manner the cable terminal, which Shobe held, came in contact with his head and he fell to the floor unconscious, with the cable terminal in his hand.

Cox immediately dismounted from the platform on which he was standing, and removed the live cable from Shobe's hand. The time was 5:25 a. m., and there was no help in the immediate vicinity. Cox immediately administered artificial respiration and continued for about one-half hour, when Shobe came to, however, out of his head. The two men were alone and when Cox attempted to get him into the company truck, Shobe, delirious, broke away from him. Shobe disappeared, and Cox meanwhile enlisted the aid of two farmers who lived nearby, who, after searching in the vicinity, found Shobe, and placed him in the Company's truck, which conveyed him to the hospital for further treatment.

At a meeting of officers, managers and some employees, about 400 in number, of the Public Service Company of Indiana and the Northern Indiana Power Company, held at the Lincoln Hotel, Indianapolis, on January 8, 1937, the Edison Electric Institute Medal was presented to Mr. Cox by Mr. C. D. Porter, vice-president and general manager of these companies. The persons who attended this meeting were from points in seventy counties in the state of Indiana.

EVERETT CRANMER
New Jersey

A line crew of the Atlantic City Electric Company were replacing overhead wires in Beach Haven, N. J., on July 24, 1936, when Walter W. Wright, a lineman, came in contact with one of the wires which carried approximately 2300 volts. Neither the injured man nor his associates know exactly how the accident occurred, but it is certain he was changing his position aloft and had unfastened his safety belt.

The electric shock rendered him unconscious, and he fell to the ground, when Everett Cranmer immediately applied artificial respiration. Another member of the line crew requested a local resident to telephone for a doctor. Resuscitation was continued by Cranmer for about 20 minutes when the first signs of life were noticeable, and for about 3 minutes longer when the injured man breathed without assistance. Meanwhile the doctor arrived at the scene, administered first-aid treatment, and Wright was then removed to a local hospital.

On January 27 the annual safety luncheon for department heads and division managers of the Atlantic City Electric Company was held at the Morton Hotel. There were twenty-eight in attendance and the presentation of the Medal to Mr. Cranmer was made at this time by Mr. E. A. Lewis, vice-president and general manager of the Company. News items reporting the presentation appeared in the Atlantic City papers.

C. F. McQUISTEN
Indiana

The old gas plant of the Public Service Company of Indiana, at Greencastle, Ind., was being dismantled by a local contractor, when, on July 7, 1936, one of his employees, Leonard Young, received an electric shock. Young was handling a guy cable on the ground when it came in contact with a 2300 volt overhead wire, rendering him unconscious.

Young fell to the ground still holding the cable, when Charles F. McQuisten, superintendent of gas distribution, reached the scene and used a dry rope to remove the cable from the grasp of the injured. McQuisten applied respiration for about 2 minutes when Young displayed signs of life, and for about 5 minutes more when assistance to breathing was no longer required. An ambulance, which had previously been summoned, arrived at this time and the injured man was removed to a local hospital for further treatment.

Mr. C. D. Porter, vice-president and general manager of the Public Service Company of Indiana, presented the Medal to Mr. McQuisten at a meeting of some four hundred persons, including officers, managers and employees of the Company, at the Lincoln Hotel, Indianapolis, on January 8, 1937.

J. B. JONES, JR.
Texas

During an electrical storm prior to July 3, 1936, lightning destroyed some metering transformers and their enclosing cabinet in a substation at Conroe, Texas. J. B. Crapp and J. B. Jones, Jr., both employees of the Gulf States Utilities Company, were sent to this location to make an inspection and repairs. A replacement cabinet was sent to them along with two additional men.

As the meter cabinet was being lifted into place, Crapp in some unexplained manner contacted with a wire carrying 2300 volts and he fell unconscious from the structure to the ground.

J. B. Jones, Jr., immediately applied the prone pressure method of resuscitation and H. J. Sisco and W. H. Brader phoned for the doctor and rendered general assistance and restored Crapp to consciousness in about 15 minutes. He was taken to a local hospital for treatment of his burns.

At a general meeting of employees of the Gulf States Utilities Company on January 30, 1937, at which there were about two hundred and twenty persons in attendance, the Edison Electric Institute Medal was presented to Mr. Jones, Jr., and Certificates of Assistance to H. J. Sisco and W. H. Brader, by Mr. Tom P. Walker, president of the Company. Mr. Crapp was also present at this ceremony.

National Electrical Housewares Week

(*Continued from page* 59)

served as a distinct aid in accelerating the rate of time between consumer-point-of-interest and -point-of-sale.

The smaller electrical cookery appliances for the table were profitably featured in contest entries. Products of one or more cooperating manufacturers were displayed in each contesting exhibit. These manufacturers were: The American Heating Company, General Electric Company, Hamilton-Beach Manufacturing Company, Knapp-Monarch Company, Landers, Frary & Clark, Manning-Bowman & Company, Proctor & Schwartz Electric Company, Robeson Rochester Corporation, Swartzbaugh Manufacturing Company, The Silex Company, McGraw Electric Company and Westinghouse Electric and Manufacturing Company.

Judges were Richard Wallace, display manager of B. Altman & Company, New York; Frank E. Watts, vice-president of Electrical Publications, Inc., and W. E. Underwood, of Tracy, Locke, Dawson, Inc.

Working the Wires While Millions Sleep

By C. M. Ripley

General Electric Company

MY eleven-year-old boy and I were spinning along a fine concrete highway and I asked him:

"Charlie, what's the difference between those thin wires on the left, and those thick ones on the right?"

"Those are telephone wires on the left, and power wires on the right."

"Yes—telephone or telegraph wires on the left. What do they carry?"

"They carry messages."

"Yes, and they carry news and even pictures, too; some operate teletype-writers—others connect broadcasting stations into radio networks; but the cleverest thing about those thin wires is, they are made to work twice around the clock every 24 hours. You might say they all work in three 8-hour shifts, for:

"Their *day* job is news and business reports. Then—when day is done——

"Their *evening* job is to carry low-rate long-distance calls and radio programs. And then—while the millions sleep——

"The *all-night* job of many is to carry thousands of telegrams called 'night letters.' Those that were written *yesterday* afternoon or evening were all delivered *this* morning anywhere between Portland, Maine, and San Diego, California. That late-hour business didn't just grow, like Topsy; it was cleverly developed by enterprise and courage. Some *enterprising* fellow got the idea of cutting the price for telegrams sent during those dull or idle hours. Then some man with *courage* said, 'We'll try it.' And—the public liked the idea. It brought in a lot of money."

"How much did they cut the price, Daddy?"

"Eighty per cent off. We can send a fifty-word 'night letter' for the price of ten words in the day. For instance: To Cincinnati, Ohio, a 10-word fast day telegram and a 50-word night letter both cost 50c. So the day rate is 5c a word, and the night letter rate is only 1c a word. That's just one-fifth of the fast day rate! It took courage to slash the rate eighty per cent off, and courage paid. Don't you think it's smart to work the wires morning, afternoon, evening, and clear through the dead of night—from bed-time to breakfast?"

"Yes—but what about the power wires?"

"They, too, have some periods when the load is not at a maximum. The street lights are burning and *some* factories run all night, especially paper mills and chemical plants; the newspaper offices, and I imagine the bakeries and the dairies, too, run part of the time. But the working hours for the millions of people in *most* homes, offices, stores, and factories are in the day time—between breakfast and supper.

"That's why the use of electricity increased more rapidly in the day than late at night. So then the Power and Light Companies began to study how to work their wires and plants harder between bedtime and breakfast.

"Some enterprising fellow figures that the cost of *additional* electricity made in those dull hours would be comparatively little. When a turbine is delivering 20,000 hp, no more clerks, engineers, or officials would be needed than if the same turbine were loafing along and delivering only 5 or 10,000 hp. He said that if they made more electricity in those relatively idle hours, about their only added expense would be coal, some labor and maintenance. Then he said, 'We *can* sell current in these hours cheaply if we can get people to use it during those hours.'

"Then some man with *courage and foresight* said, 'Let's try it.' Perhaps he thought of the 'night letters'—and perhaps he didn't. Maybe he thought how the movies charge 40c in the evening rush hour and only 25c during the slack afternoon. Anyway, they tried charging 1 cent for electricity to heat water, *during the dead of night*. Can you guess how they prevent the water heaters being used in the day at the 1c rate?"

"I suppose a timer turns the juice on and off at the right time."

"Yes—that's one way. A first-class electric water heater can be cut off the line during the usual rush hours or 'peaks,' and still can heat enough water to last any home all day because the tank is properly insulated. Now the *average* rate paid for household electricity is 5c per kwhr and the idle hour or 'off peak' rate is often only 1c.

"See how that electric rate cut is like the night letter rate cut?

"The night-letter rate per word was one-fifth that of the fast day telegram, and the off peak water-heating rate is also one-fifth that of the average rate. Both were slashed 80 per cent off!"

"Gee—that's funny—not 50-50; but 80-80 off."

"Yes—and the public liked *that,* too. Many other companies are doing it now. Those with water power plants get money for running the water through the turbines instead of over the dam."

"That *is* smart."

"You bet. Then there's another and newer scheme that uses no set timer and does not require as large a water tank. It is called 'carrier current.' By just throwing one little switch in the power house, the engineer can turn on, or cut off, every water heater on the line any time he wants to. He doesn't care when the rush hours come. The heavy demand or 'Rush' doesn't always come at the same hours. For instance, Daylight saving changes it, and ironing on Tuesdays.

"They can be turned 'on' between bedtime and breakfast, or any other time night or day, whenever the power equipment is loafing, and the wires are relatively idle. And they can be turned 'off' when the load gets heavy—any time—including emergencies.

"It's a queer situation with two different kinds of electricity going through the same wires at the same time. One to heat the water and the other to turn it on or off. The regular electricity and the little high frequency 'carrier currents' never get tangled up with each other, either. It's a case of the little c.c. fellow making the big fellow work better for all concerned."

"Are many electric companies cutting rates to 1c at night and during idle hours, daddy?"

"Yes—and the number is constantly growing. Some people claim that water heating is the fastest growing branch of the power business. We can see the time not far distant when millions of dollars in additional revenue will accrue to the utilities from this service which they term off-peak water heating."

"Handbook of Interior Wiring Design"

Links Better-Wiring Idea to Increased Service

AFTER months of deliberation by some of the best informed minds in the several branches of the industry, a "Handbook of Interior Wiring Design" has become an accomplished fact. The problem of inadequacy in capacity and the handicap it brings in connection with load building emphasized the need for such a reference book and in June, 1935, action was taken by the Sales Committee of Edison Institute. Mr. E. A. Brand, Niagara Hudson Power Co., Buffalo, N. Y., representing the Wiring Committee, was asked to organize a Joint Committee to undertake the job. It has taken months of painstaking effort on the part of the Technical Subcommittee and the general Committee under his chairmanship to bring to completion this publication.

Specifications, details and plans of complete wiring design, developed to meet increased electrical demands of the present and future, have been compiled within the covers of "The Handbook." It is now released nationally under the sponsorship of the entire electrical industry. Every person identified in any way with electrical interests will want to see this book, and will be at once impressed with the tremendous potentialities in electrical development which it suggests.

Every type of interior wiring design has been informatively treated in the subject matter. Tables of data, diagrams, check lists, sample specifications and contract forms, essential surveys, practical design data, terminology and miscellaneous facts are presented with clarity and precision.

Residence Wiring is covered in Section 1, in subdivisions of General Analysis, Standards of Adequacy, Chart of Outlet Requirements, Specification Form and Sample Specification. This section includes a thorough survey of residence wiring, and adds electrical requirements of each room, a check list for quick reference and a specification form which is basic in character. Increasing demands on residential wiring and the trend toward greater convenience are emphasized.

Section 2, "The Wiring of General Occupancies and the Advantages of Adequate Wiring," contains a study of the technical advantages of adequate wiring, with reference to the operation of equipment, overall economics, and the problems of continued modernization. Section 3 is devoted to lighting fundamentals, and will be of special interest to the utility man who requires a working knowledge of every angle of consumer interest.

"Wiring Standards for General Occupancies," Section 4, includes design standards for multi-family dwellings, commercial, industrial and public buildings, and power wiring. Standards of outlets, switch control, circuiting, panel board, feeder and service entrance design for general occupancies are followed by a discussion of the conditions of power wiring adequacy for these occupancies. Here is a representative picture of what is being used today and what must be made available if the industry is to meet the ever-increasing electrical demands.

Section 5 outlines procedure in design, and provides a practical addition to the individual standards of Section 4. Typical sample problems in wiring layout form the basis of specific designs. Contracts and Specifications, in Section 6, conclude the manual, and add both general information on the preparation of contracts and specifications and a survey of phases which should be examined and checked in every installation.

Efforts of the utility companies to raise the whole level of the industry and to eliminate unsound and uninformed bidding methods will be distinctly served in the practical use of this book. Utility men who are interested in better-satisfied customers and who want them to receive the most for their electrical expenditure in convenience, economy, comfort, labor-saving and safety in the home and business will receive this handbook with enthusiasm.

Nation-wide acceptance of this standard of interior wiring design will go far toward getting rid of the bottle-neck of inadequate wiring which today limits utility demand.

The "Handbook of Interior Wiring Design" is the only book of its kind which bears the approval of the entire electrical industry. In joint sponsorship with Edison Institute are the Artistic Lighting Equipment Association, Illuminating Engineering Society, International Association of Electrical Inspectors, National Electrical Contractors Association, National Electrical Manufacturers Association, National Electrical Wholesalers Association and the Radio Manufacturers Association.

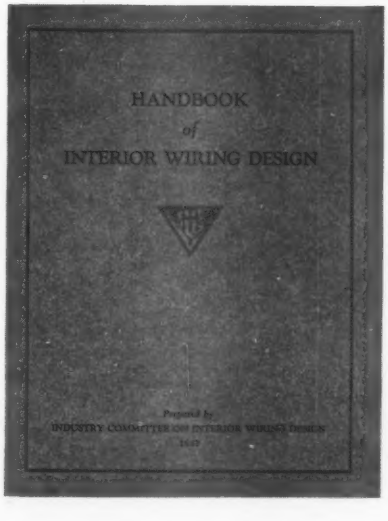
CALLING ALL COMMERCIAL MEN

to Edgewater Beach Hotel, Chicago, for Fourth Annual Sales Conference and Second Annual Industrial Power Sales Conference on March 30-31 and April 1, 1937.

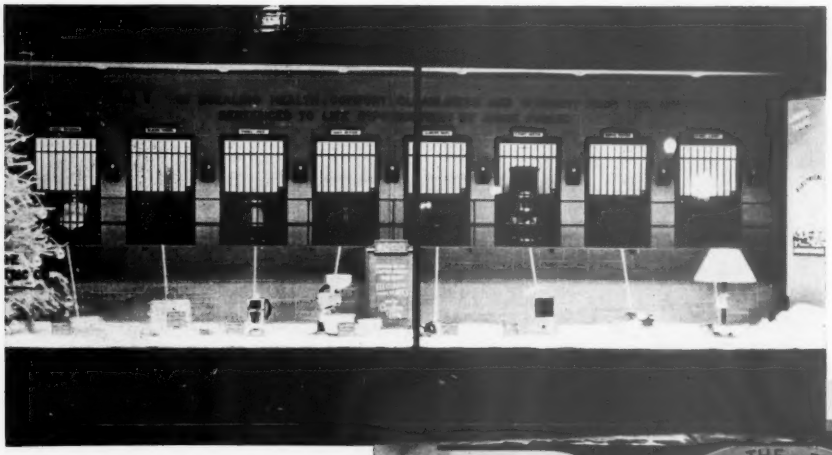
A three-day program of presentations by authoritative speakers on present business building problems.

Your associates from other sections of the country will be there.

Make your plans now to attend.



Display Windows Prize Winning Exhibits—National Electrical Housewares Week



ABOVE—*First Prize, Utilities Division, Empire Gas & Electric Co., Auburn, N. Y.*

RIGHT — *First Prize, Department Stores Division, Kresge's Department Store, Newark, N. J.*

LEFT—*First Prize, General Dealers' Division, Electrical Equipment Co., Morgantown, N. Y.*

RIGHT — *Honorable Mention, Utilities Division, Northern States Power Co., Eau Claire, Wis.*

Now Ready: "Meals Go Modern—Electrically"

"MEALS Go Modern—Electrically" is the National Kitchen Modernizing Bureau's newest publication, which will be off the press in early March.

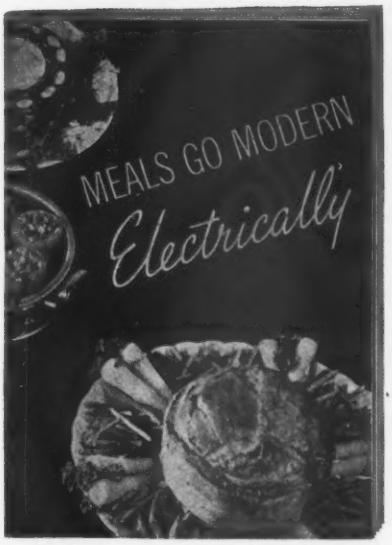
The book, written by Miss Grace Stockwell, well-known food economist and magazine writer, includes 80 pages, with four-color illustrations. Its primary purpose is to describe and explain clearly the simple technique of electric range operation. It contains helpful information on the general principles of success in electric cooking, regardless of the make of electric range which the housewife may use.

Chapter headings of "Meals Go Modern" include "Count Your Savings," "Oven Dinners," "Meats for the Oven," "Broiling Electrically," "Top of Range Cooking," "Deep-Well Cooking," "Small Appliances," "Home Canning," and "Cleaning and Care of the Electric Range." The important subject of oven dinners is thoroughly covered, with space devoted to oven dinners for guests, for busy days, and for budgeteers.

While it contains many menus and recipes, it is not just another recipe book. Its purpose is not to take the place of any of the excellent books which have been published by other agencies, but rather to bring to electric range users, present and future, an informative Cooking Manual quite different from any other publication.

The book is designed for distribution by utility companies and is offered to them at quantity prices to encourage widest use. To those companies interested in building range load, the book should be especially valuable in the hands of customers who now own electric ranges but who may not be realizing the full convenience and practical economy of cooking with electricity. Field surveys reveal that the majority of owners are seldom informed on the complete possibilities of the newer electrical kitchen equipment. Few housekeepers will fail to discover in this publication new cooking uses for their electric ranges.

"Meals Go Modern" should also be extremely valuable for promotional use



with prospects who have not yet installed electric ranges in their homes, but who might do so advantageously. The theme which runs through the entire book is the variety of ways in which the electric range adds to the convenience and comfort of the kitchen and accomplishes new success in cooking. Every woman who reads it will want that convenience, comfort and success for herself.

National Electrical Housewares Week Scores Again

PRIZES for the best window or store interior displays featuring electrical housewares as useful Christmas gifts, offered in connection with National Electrical Housewares Week, have been awarded by the Institute, which sponsored the contest in conjunction with leading electrical manufacturers.

John L. Ryan, Empire Gas & Electric Company, Auburn, N. Y., won first award in the Utility Company Division, an all-expense six-day cruise to Bermuda. W. C. Davies of the Electrical Equipment Company, Morgantown, West Virginia, won a Bermuda cruise in the Electrical Dealer Division, and Charles F. Hart, Jr., of Kresge's Department Store, Newark, N. J., took a similar prize in the Department Store Division.

Mr. Ryan's exhibit, winner in the Utility Company Division, was keyed to his home town, Auburn, N. Y., site of a famous prison, and occupied a full-front store window. Out-moded household devices were displayed "condemned for life" behind prison bars at the back of the window. In the foreground, modern electrical appliances were dramatically displayed, each one placed in contrast to its old-fashioned predecessor as the housewife's release from drudgery. Mr. Davies' window was a timely stimulant to Christmas trade in electrical appliances, while Mr. Hart, winner in the Department Store Division, presented an electrical appeal of moment, which featured a mammoth clock dial.

Honorable mentions in the Utility Company Division went to Fred Bolander of West Penn Power Company, Pittsburgh, Pa., S. L. Hagen of Northern States Power Company, Eau Claire, Wis., Stanley A. Wirbel of Consumers' Power Company, Grand Rapids, Mich., and to the Philadelphia Electric Company, Philadelphia, Pa.; in the Electrical Dealer Division to Mrs. Harold Weidner of Knecht-Feeney Electric Company, Mount Vernon, Ohio, the Barber Electric Company, Watertown, N. Y., the Iron City Electric Company, Pittsburgh, Pa., and Urbany's Radio and Electric Service, Masontown, Pa.; and in the Department Store Division to Karl Kneis of Stix, Baer & Fuller, St. Louis, Mo., E. W. Booth of B. Lowenstein's, Memphis, Tenn., Harry A. Bell of the Broadway Department store, Los Angeles, Cal., and G. H. Wagner of Peck's, Kansas City, Mo.

Seventy-five thousand full-color National Electrical Housewares Week posters were distributed by the Electrical Housewares Week Committee early in the season to electrical dealers of all classes. The poster dramatized the old-fashioned Santa Claus presenting useful modern electrical gifts, and was used to identify all entrants in the Electrical Housewares Week Display Contest. The time element involved in the effort to record a high total of Christmas sales is essentially important, and the National Electrical Housewares Week poster

(*Continued on page* 55)

Transmission and Distribution Committee Meeting

P. H. Chase, *Chairman*

THE Transmission and Distribution Committee held its Twelfth Meeting at the Bellevue-Stratford Hotel, Philadelphia, on January 21 and 22. More than 100 engineers of electric light and power companies throughout the country were in attendance.

The morning session of January 21 was given over to papers and discussion by the Standards and Specifications Group and the Overhead Transmission Group. Mr. H. P. Seelye, Sponsor of the Standards and Specifications Group gave a paper on the Fundamentals of Standards and Specifications. This was followed with a paper by Mr. B. M. Smalley, vice-president of the Joslyn Manufacturing and Supply Co., who discussed Standards and Specifications From the Manufacturer's Point of View.

Mr. A. K. MacNaughton presided during the session on Overhead Transmission owing to the illness of the sponsor, Mr. Mark Eldredge. During this session a paper was presented by Mr. J. L. Schueler, superintendent, Steel and Wire Division of the Continental Steel Co., on the Flame Seal Process of applying zinc coating to iron and steel wire. The paper which Mr. Schueler presented was one of a series which Mr. Eldredge has arranged for the Transmission Group. Other papers on this general subject were presented at Memphis and Detroit meetings. During this session progress reports were presented on the following subjects: Collection of Data on 110/132 Kv Transmission Line Outages; Possibilities in the Application of Extremely Rapid Re-Closing Circuit Breakers; and Relay Combinations to Improve Line Service. A verbal report was made on the Joint Session that was held on the preceding day by the Underground Group; High Tension Cable Committee of the AEIC, and the Insulated Power Cable Engineers Association. Copies of the printed report on 1935 Cable Operation, EEI Publication No. D17, were distributed.

There was no meeting of the main committee during the afternoon of January 21. Instead, three subject sessions were held as follows:

Secondary Over-Current Protection on Radial Distribution Transformers, Merrill DeMerit, leader.

Arc Frequency Components as an Aid to Relaying Line Faults, A. K. MacNaughton, leader.

Lightning Protection on 11 to 33 Kv Distribution Circuits, Nicholas Stahl, leader.

Each of these three subject sessions met throughout the afternoon and were attended by those particularly interested in the subjects scheduled for discussion.

During the evening, a lecture and demonstration on the History and Theory Relating to the Development of Lightning Protection were given in the auditorium of the Philadelphia Electric Company Building, by Sigmund K. Waldorf, Test Engineer of the Pennsylvania Water & Power Co. The demonstration involved the use of a small scale lightning generator with a model transmission line.

Closed sessions were held during the forenoon and afternoon of January 22. Reports were presented by the Subject Session Leaders concerning the meetings that had been held on the preceding afternoon.

An interesting paper was presented by Mr. A. E. Silver on Experience With Simplified Design of Farm Lines. Mr. L. G. Smith presented a report on Distribution Tranformer Lightning Protection Experience Covering the Year 1935. Both of these papers were followed by discussions. At the close of this session, the meeting was favored by Mr. Constantine Barry, Engineer, Rate and Standard Practice Department, Philadelphia Electric Co., who gave an illustrated talk on the Value of Data on Load Characteristics in Engineering, Economic, and Rate Problems.

During the afternoon session, Mr. W. J. Lyman presented a paper entitled, Relation Between Load, Capacity, and Service Continuity. The Standards and Specifications Group presented progress reports on Specifications for Creosoted Pine Poles; Line Fuses; Pole Line Hardware; Insulators; and Wood Crossarms. Brief reports were also made on Hard Drawn Copper Transmission Cable, and Weather Proof Wire Specifications.

During this session there were presented under the sponsorship of the Plant Coordination Group, two reports relating to the joint use of wood poles. These had recently been printed and copies were distributed. The first of these was a report entitled: Joint Use of Poles—Telephone Circuits and 6.6 and 13.2 KV Power Circuits—Safety Features (EEI Publication No. E4). The other was the Revised Specifications for the Construction and Maintenance of Jointly Used Wood Pole Lines Carrying Supply and Communication Circuits (EEI Publication No. E3). Copies of these printed reports may be obtained through the EEI General Office.

A very interesting feature of this meeting of the Transmission and Distribution Committee was a President's Luncheon held at the hotel at noon on January 21. Mr. C. W. Kellogg, president of the Edison Electric Institute, and Mr. H. P. Liversidge, vice-president of the Philadelphia Electric Co., were present and gave interesting short addresses. Practically all who were in attendance at the main meeting of the committee on January 21 were present at this luncheon meeting.

On January 20, the day preceding the meeting of the main committee, two special meetings were held. One of these, under the leadership of Mr. G. S. Van Antwerp, was on the subject of Communication With Mobile Units. The forenoon was a closed session during which time the experience of member companies and their requirements were discussed. The afternoon of this meeting was an open session with representatives of manufacturers present.

The other special meeting was a joint meeting by the Underground Group of the Transmission and Distribution Committee, the High Tension Cable Committee of the AEIC, and the Insulated Power Cable Engineers Association. Due to the illness of Mr. H. R. Searing, Mr. W. H. Cole presided. Papers and addresses were presented during this session as follows:

Paper Cable—W. A. Delmar, Habirshaw Cable and Wire Corp.

Rubber Cable—E. W. Davis, Simplex Wire and Cable Co.

Varnished Cambric Cable—W. C. Hayman, General Electric Co.

Metals—W. H. Bassett, Jr., Anaconda Wire and Cable Co.

Operating Experience on a Compensated Sheath Type of High Voltage Cable—E. R. Thomas, Consolidated Edison Co. of New York, Inc.

Cable Operating Data for Germany and for the 60 Kv System in Paris—Herman Halperin, Commonwealth Edison Co.

Further Results of Laboratory Tests of Cable at Elevated Temperatures—W. F. Davidson, Consolidated Edison Co. of New York, Inc.

Reports on both of these special sessions were presented at the meeting of the main committee on the following days.

Announcement was made during this meeting, of the organization of a Subject Committee under the Underground System Group with Mr. J. A. Brooks as chairman. The purpose of this Subject Committee is to investigate and study the methods and accessories pertaining to underground construction. Reports will be made at each of the meetings of the main committee covering the work done by this Subject Committee. The membership of this Subject Committee is not limited to members of the Transmission and Distribution Committee, but any member company desiring to do so may designate a representative to serve on this group. An organization meeting of this Subject Committee was held on the afternoon of January 21.

No special program of inspection trips was planned in connection with this meeting, although the Philadelphia Electric Co. very generously arranged for visitors to see nearby points of engineering interest.

Chairman Chase announced that the next meeting would probably be held May 6 and 7 in Chicago.

Electrical Equipment Committee Meeting

J. F. Fairman, Chairman

THE winter meeting of the Electrical Equipment Committee was held at the Biltmore Hotel, Dayton, Ohio, on February 8 and 9, the meeting being transferred from Cincinnati due to flood conditions there. About thirty members of the Committee and twenty guests were present.

A closed session of the Committee was held Monday morning and at this session such subjects as apparatus failures, system interruptions, and oil fire fighting were reviewed by the members of the Committee. Open sessions where guests were present were held on Monday afternoon, Tuesday morning and Tuesday afternoon.

Monday evening the members of the Committee were guests of the Dayton Power and Light Company at a dinner at the Engineers' Club. Following this dinner, Mr. Bennett of the Miami Conservancy District gave an illustrated talk describing the flood control system built following the 1913 flood for the protection of Dayton.

Modernization of electrical equipment and design again formed an interesting basis for presentation of several papers. Oil circuit breakers can be modernized by the manufacturers so as to give almost any desired improvement in characteristics. This may consist of either a slight modernization of the arcing chambers or contacts or a complete rebuild of the breaker. Mr. Sims described the modernization being accomplished in the Fisk Street Station of the Detroit Edison Company in connection with the super-imposed high pressure turbines now being installed. The electrical changes will include, among other things, a new control system and changes in the switching galleries.

For many years accepted standards have been available for the testing of insulation on new machines; however, no accepted standards have been available for the testing of insulation on old or rebuilt machines. This subject is being actively sponsored by Mr. Van Ness and a detailed study will be made, probably including tests to destruction of the coils of some machines which are no longer useful for service requirements.

Engineers responsible for the development of an electrical system must look several years into the future to see that the necessary generation, transmission and distribution system is available when the load requirements call for it. All of this apparatus takes time to build and assemble so that plans must be made long in advance. Mr. Hester presented a paper giving the fundamentals of the system planning for the Duquesne Light Company. This paper pointed out that the basic plan must be all-inclusive in its scope and must also be flexible so as to take advantage of changing conditions, or of improvements in the art. The difference between system planning and load forecasting was emphasized. In system planning, it is necessary to know what to do with the system when a load of a given magnitude must be carried by the system. On the other hand, load forecasting is designed to determine the dates when such loads will be on the system.

When a frequency standard of sixty cycles was first adopted, apparatus to measure frequencies within one or two cycles was all that was available. This provided a satisfactory standard both for the operation of the utility and for the service required by the customer. With the development of interconnections between large systems, such crude standards, of course, would be totally inadequate. At the present time, with many large systems in parallel, it is necessary to maintain very close standards of frequency by automatic apparatus and to provide for the control of loading of tie lines of an interconnection so that large fluctuations of load will be avoided. The requirements of different systems are entirely different, depending upon the nature of the system, its load and the nature and capacity of the interconnection. It was pointed out that the requirements for system operation were much more severe than those actually necessary for one of the more obvious applications, namely, the use of system frequency as a standard for time. Means for accomplishing the necessary degree of regulation were described by representatives of the American Gas and Electric Company, Commonwealth Edison Company, Leeds and Northrup Company and New York Edison System. Instead of the original one-cycle variation, or thereabouts, which was formerly considered satisfactory, these large systems are now held to a frequency error of 0.01 cycles with a possible cumulative time error of 3 seconds.

Mr. Shuler presented on behalf of Mr. Fields a vivid description of the fight of the Cincinnati Gas and Electric Company against the rising waters of the Ohio River. Although this system lost the generating capacity of its two main generating stations, due to flooding of the auxiliaries, the bus voltage was never lost. The system succeeded in maintaining energy to the downtown network and to all emergency service. In order to accomplish this, many detailed plans had to be made and executed promptly as the water of the river rose. Mr. Fields' paper emphasized the assistance which was rendered in maintaining this service by the neighboring utilities which made available all possible capacity.

The next meeting will be held at the Edgewater Beach Hotel, Chicago, on May 3 and 4. This meeting is being coordinated with the meetings of the other engineering committees of the Institute.

PUBLICATIONS OF THE INSTITUTE

Pub. No.		*Date Issued*	*Price to Members*	*Price to Non-Members*	*Price to Foreign Countries*
E2	The Electric Light and Power Industry in 1936	(1/37)	$0.30	$ 0.75	$ 0.85
E3	Jointly Used Wood Pole Lines Specifications	(1/37)	.50	1.50	1.60
E4	Joint Use of Poles, 6.6 and 13.2 kv, Safety Features	(1/37)	.30	.75	.85
E5	Principles and Practices for Inductive Coordination, A.A.R. and E.E.I.	(1/37)	n. c.	n. c.	n. c.
D1	The Objective Type Rates; 1933-1936	(4/36)	.80	2.00	2.15
D2	The Electric Light and Power Industry in 1935	(6/36)	.30	.75	.85
D5	Power Station Chemistry—1936	(7/36)	.20	.50	.55
D6	Boilers, Economizers, Air Heaters and Piping—1936	(9/36)	.60	1.50	1.60
D7	Combustion, 1936	(10/36)	.60	1.50	1.60
D8	Superposition of High Pressure Non-Condensing Equipment on Existing Power Stations	(10/36)	.25	.65	.75
D9	Principles and practice in Grounding	(10/36)	.40	1.00	1.10
D10	Oil and Gas Engines—1935-1936	(10/36)	.40	1.00	1.10
D11	Turbines, Condensers, Feedwater Heaters and Pumps—1936	(11/36)	.60	1.50	1.60
D12	Air Conditioning—1936	(11/36)	1.20	3.00	3.15
D13	Engineering Reports of the Joint Subcommittee on Development and Research—Vol. III	(1/37)	5.00	10.00	10.00
D14	Engineering Reports of the Joint Subcommittee on Development and Research—Vol. IV	(1/37)	5.00	10.00	10.00
D15	Penstocks	(12/36)	1.00	2.50	2.65
D17	Cable Operation—1935	(12/36)	.60	1.50	1.60
C4	Boilers, Economizers, Air Heaters and Piping—1935	(7/35)	.60	1.50	1.60
C5	Turbines, Condensers and Feedwater Heaters—1935	(7/35)	.40	1.00	1.10
C6	Combustion—1935	(8/35)	.80	2.00	2.15
C7	Air Conditioning—1935	(9/35)	.50	1.25	1.35
C8	Oil and Gas Engines—1934-1935	(10/35)	.50	1.25	1.35
C9	Methods of Measuring Radio Noise	(11/35)	.15	.35	.45
C10	Symbols for Metering Diagrams	(12/35)	.10	.10	.10
C11	Cable Operation—1934	(12/35)	.60	1.50	1.60
C12	Twelve Messages on Accident Prevention in the Electric Public Utilities	(12/35)	.10	.10	.10
C14	Resuscitation Charts	(4/36)	1-10 copies 11-100 copies 101-1000 copies 1001 or more	.10 each .05 each .04 each .03 each	
B2	Air Conditioning—1934	(5/34)	.75	1.85	2.00
B3	Condensers, Feedwater Heaters, Evaporators, and Boiler Feed Pumps—1934	(6/34)	.45	1.15	1.25
B4	Turbins—1934	(6/34)	.40	1.00	1.10
B5	Station Piping—1934	(7/34)	.60	1.50	1.60
B7	Oil and Gas Engines	(8/34)	.40	1.00	1.10
B8	Steam Generation	(8/34)	.60	1.50	1.60
B9	The Electric Light and Power Industry in 1933	(10/34)	.30	.75	.85
B10	Electrical Energy Diversion	(10/34)	.20	.50	.55
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B12	A-C Network Operation—1932-1933	(12/34)	.40	1.00	1.10
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A10	Cable Operation—1932	(8/33)	.45	1.15	1.25
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A14	Current Carrying Capacity of Impregnated Paper Insulated Cable	(7/33)	.25	.65	.85
A16	Load and Revenue Forecasting	(7/33)	.30	.75	.85
A17	Promotion of Home Air Conditioning	(8/33)	.20	.50	.60
A19	Hydraulic Governors	(8/33)	.20	.50	.60

The prices include mailing charges. Member prices apply to employees of company members of the Institute. Please send money order or check with order. Orders should be addressed to—

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POWER SALES ITEMS

AIR CONDITIONING

"What of the Future in Air Conditioning?" by Walter L. Fleisher. *Heating, Piping and Air Conditioning,* January, 1937, pp. 1-7. Keeney Publishing Company, Publishers, 6 North Michigan Ave., Chicago, Ill.

Mr. Fleisher is a very outstanding authority and goes into the subject extensively in his discussion of the future of air conditioning. He also cites a number of references in the footnotes and gives considerable information covering the entire United States.

"Estimating the Potential Market for Commercial Air Conditioning," by Knight C. Porter and William P. Rock. *Heating, Piping and Air Conditioning,* January, 1937, pp. 8-10. Keeney Publishing Company, Publishers, 6 North Michigan Ave., Chicago, Ill.

This is a resume of the survey made for the Commonwealth Edison Company. The article is quite short but contains considerable information in a brief way.

"An Annual Air Conditioning Review." *Heating, Piping and Air Conditioning,* January, 1937, p. 31. Keeney Publishing Company, Publishers, 6 North Michigan Ave., Chicago, Ill.

A review prepared by *Heating, Piping and Air Conditioning* giving information on installations in the United States.

"Research—Treatment of Disease by Air Conditioning to be Studied by ASHVE in 1937 Research." *Heating, Piping and Air Conditioning,* January, 1937, p. 40. Keeney Publishing Company, Publishers, 6 North Michigan Ave., Chicago, Ill.

This short article is written by Brewster S. Beach and indicates that further research is to be made on the value of air conditioning in the treatment of disease.

"What Air Conditioning Means to the Retailer," by Verda Jensen. *Heating, Piping and Air Conditioning,* January, 1937, p. 48. Keeney Publishing Company, Publishers, 6 North Michigan Ave., Chicago, Ill.

This is good commercial and economic information for the sales standpoint.

AUTOMOTIVE INDUSTRY

"Steel Sheets for Today's Motor Car," by Thomas P. Archer, Fisher Body Company, and R. A. Geuder, Reliance Electric & Engineering Co. *Iron and Steel Engineer,* December, 1936, p. 28. Association of Iron and Steel Engineers, Publishers, 1018 Empire Building, Pittsburgh, Pa.

Presentation of some typical mechanical and electrical problems of motor car fabrication.

BRIDGE LIGHTING

"California's Newest Highway Link, the San Francisco-Oakland Bay Bridge Joining Its Namesake Cities, Is the Finest Example of Roadway Illumination in the World." *Electrical West,* December, 1936, p. 53. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

COAL MINING

"Electric Power Essential to Modern Strip Coal Mining," by E. R. Lewis. *Electrical World,* December 19, 1936, p. 3902. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Purchased power much more economical and practical than local generation because the plant investment would have to be written off in very few years and condensing water is usually lacking.

DIESEL ENGINES

"The Diesel Discovered. Forty Years After Adolphus Busch Introduced the Diesel to America the Newspapers and Public Rediscover it as a Railroad Achievement. Development Really Started During the World War and It Is Estimated Well Over 2,000,000 HP Were Manufactured In This Country During 1936." *Power Plant Engineering,* January, 1937, p. 41. Technical Publishing Company, Publishers, 53 West Jackson Blvd., Chicago, Ill.

ELECTRIC FURNACES

"The Development and Application of Electric Resistance Furnaces," by A. N. Otis. *General Electric Review,* December, 1936, p. 601. General Electric Company, Publishers, 1 River Road, Schenectaday, N. Y.

Innovation of the resistance furnace in commercial service. Steel mill and other applications.

FUELS

"Fuels Go High Hat—Coal Preparation Improves Heat Value and Combustion Characteristics. Oil and Gas Fuels Grow More Important in Power Field." *Power Plant Engineering,* January, 1937, p. 24. Technical Publishing Company, Publishers, 53 West Jackson Blvd., Chicago, Ill.

INDUSTRIAL ELECTRIFICATION

"Industrial Electrification." *Electrical World,* December 19, 1936, p. 68. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Four items which contain ideas for power sales:

Dessert maker uses electric heat seal.

Electric heat abolishes fume hood.

Manufactured weather for lithograph plant.

Gearmotor replaces felt-friction drive.

RATES

"What Is Electricity Worth?" by A. W. Park. *Public Service Magazine,* January, 1937, p. 32. Harvey J. Gonden, Publisher, 35 East Wacker Drive, Chicago, Ill.

The importance of electric rates greatly exaggerated.

STATISTICS

"Thirty-Third Annual Statistical Number." *Electrical World,* January 2, 1937. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Review of the progress made in the electric light and power industry in 1936.

STEAM PLANTS

"Steam Plants — Additions to Existing Plants. Superposition Units, Larger Capacity High-Speed Turbines; Development of a Compact Automatic Boiler Plant Complete with Auxiliaries. List of Steam Plants Placed in Operation or Under Construction During 1936." *Power,* Mid-December, 1936, p. 704. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

"High-Pressure Installation at Mannheim, Germany," by G. Kordes. *Combustion,* December, 1936, p. 16. Combustion Publishing Company, Inc., Publishers, 200 Madison Avenue, New York City.

The first superposed extension to this station was made in 1928. This year a fourth boiler of 308,000 lb. per hr. and different design and two turbines, one back pressure and the other condensing, were added.

"Stream Line Trends in Plant Design. Superimposed Plants Gain the Spotlight Temporarily by an Unexpected Sprint. Reheat Abandoned. New Plants Will Favor Medium Pressure, High Temperature Range." *Power Plant Engineering,* January, 1937, p. 16. Technical Publishing Company, Publishers, 53 West Jackson Blvd., Chicago, Ill.

STREET LIGHTING

"Street Lights Better with Photo Control," by O. W. Holden. *Electrical World,* December 19, 1936, p. 3900. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Experience gained from experimental photo-electric street lighting controller installation on the Hollywood carrier-current system indicates better lighting schedule possible without materially increasing the annual hours of service.

WELDING

"Commercial Welding as Applied to Steel Mills," by H. A. Woofter, Federal Machine & Welder Company, Warren, Ohio. *Iron and Steel Engineer,* November, 1936, p. 31. Association of Iron and Steel Engineers, Publishers, 1018 Empire Building, Pittsburgh, Pa.

Short paper on the variables in flash welding and a brief description of a new method of welding.

"Resistance Welding in Steel Mills," by Walter Anderson and Malcomb Clark, Taylor Winfield Corporation, Warren, Ohio. *Iron and Steel Engineer,* November, 1936, p. 20. Association of Iron and Steel Engineers, Publishers, 1018 Empire Building, Pittsburgh, Pa.

"Welder Energy Supply A Service Problem," by A. L. Lane. *Electrical World,* December 5, 1936, p. 45. McGraw-Hill Publishing Co., Inc., Publishers, 330 West 42nd Street, New York City.

Federal Power Policy

(*Continued from page* 38)

It certainly will not decide that because its own activities in the power field are restricted to the development of water power, it can look with contempt upon the increasing efficiency of steam power.

It will not overlook the possibility of the development of cheaper power sources than either fuel or water. It knows that the sun engine, for example, which, midway between the Capitol and the White House, the government's own Dr. Abbot of the Smithsonian Institution is developing, will probably be commercially practicable for large amounts of power within a generation.

It will realize that it must keep alive private producers and purveyors of power who are free to experiment, free to engage in new methods, free to develop cheap power in ways from which the government itself is constitutionally disbarred.

A wise government will recognize what former President Hadley of Yale has pointed out: that it has been habitually unsuccessful whenever it has tried to run industries in which success depends upon something more than the performance of routine duties; in which depreciation is an unknown factor; in which new inventions and new methods often render a plant obsolete long before it is worn out; in which a year's budget does not and cannot accurately reflect the year's actual conditions.

And finally, a politic government will anticipate the limiting effect social and economic forces may have upon it before it commits itself irrevocably to one course of action. It knows that the coal industry is a sick industry and that, in the Guffey Act, it has itself put that belief into words. It knows that every water-power project that it builds puts thousands of miners out of work. It will foresee that efforts to make electricity cheaper by increased water-power production alone, however well meant these efforts may be, are going to promote government ownership and operation of the coal mines and permanent government subsidization, through relief, of a large portion of the population of several states.

CONVENTIONS AND MEETINGS

FEBRUARY

8- 9	Electrical Equipment Committee, EEI, Cincinnati, Ohio.
9-10	Electric Metering Conference, Deshler-Wallick Hotel, Columbus, Ohio.
14-18	National Electrical Manufacturers Association, New York, N. Y.
15-16	Prime Movers Committee, EEI, Statler Hotel, St. Louis, Mo.

MARCH

1- 5	American Society for Testing Materials, Chicago, Ill.
15-16	Engineering and Accounting Divisions, Rocky Mountain Electrical Association, Denver, Colo.
15-19	National Oil Burner and Air Conditioning Exposition, Philadelphia, Pa.
25-27	Business Development Section, Northwest Electric Light and Power Association, Hotel Utah, Salt Lake City, Utah
29-31	Fourth General Sales Conference, Edgewater Beach Hotel, Chicago, Ill.

APRIL

1- 2	Fourth General Sales Conference, Edgewater Beach Hotel, Chicago, Ill.
5- 6	Engineering Conference and Rural Conference, Missouri Valley Electric Association, Kansas City, Mo.
21-23	Missouri Association of Public Utilities, Elms Hotel, Excelsior Springs, Mo.
26-28	Chamber of Commerce of the U. S. A., Washington, D. C.
30	Nebraska Electric Association, Annual Safety Conference, Lincoln, Neb.

MAY

3- 7	Technical Committees, Edison Electric Institute, Edgewater Beach Hotel, Chicago, Ill.
3- 7	American Foundrymen's Association, Milwaukee, Wis.
10-12	Institute of Radio Engineers, New York, N. Y.
10-14	National Fire Protection Association, Chicago, Ill.
17-21	National Electrical Manufacturers Association, The Homestead, Hot Springs, Va.
20-21	Pacific Coast Electrical Association, annual convention, Hotel Huntington, Pasadena, Calif.
23-27	National Electrical Wholesalers Association, Hot Springs, Va.
24-27	National Association of Purchasing Agents, Pittsburgh, Pa.
27-29	Southeastern Electric Exchange, annual convention, The Homestead, Hot Springs, Va.

JUNE

1- 4	EDISON ELECTRIC INSTITUTE, Palmer House, Chicago, Ill.
20-25	American Home Economics Association, Kansas City, Mo.
24-26	American Society of Heating and Ventilating Engineers, Swampscott, Mass.

Farm Line Operating Experience

(*Continued from page* 40)

distances involved, servicing would be expected to be proportionately increased; however, the lack of comment on this point by operating companies would indicate that nothing abnormal has been encountered.

One company reports that the new type of construction decreases radio interference due to the elimination of crossarms, braces, transformer hangers, methods of attaching guys, and other features. Another company reports that the amount of tree trimming required for the ridge pin type of construction is considerably less than that for standard crossarm construction.

Experience to date is reassuring as to the safety of workmen, customers, and public, as related to the common multigrounded circuit neutral, and to the single bushing transformers with grounded cases.

Conclusion

Reviewing the results, experience to date has strengthened our conviction that these simply designed lines, embodying high strength conductors, long spans, medium insulation, common multigrounded neutral, spill gap protection, and rapid fault disconnection and reclosure, can be depended on to give excellent service to the farms. On those systems readily adaptable to this type of extension, and where the greater effort has been directed to working out the needed coordination, the results are especially reassuring.

The combination of spill gaps to protect equipment insulation, with rapid fault disconnection and reclosure to effect service continuity, perhaps more than any other feature, has been on trial. With continued experience and engineering attention, steady progress may be expected in further improving the coordination and functioning of these features. The results bear out that excellent protection is afforded to equipment, and indicate that satisfactory service can be maintained, even with extensively exposed lines in severe lightning areas.